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# STATE OF MONTANA
# OFFICE OF THE STATE FORESTER

# OPERATION MANUAL

# YOUTH FOREST CAMP WORK PROGRAM

Revised:______________________

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June 1968

OPERATIONAL MANUAL

YOUTH FOREST CAMP WORK PROGRAM

SUBJECT INDEX

PREFACE . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . X

OPERATIONAL POLICY STATEMENT . . . . . . . . . . . . . . . . . . . . . . . . . . . 1

FORESTRY STAFF JOB DESCRIPTIONS:
  Chief Youth Camp Forester . . . . . . . . . . . . . . . . . . . . . . . . 2
  Youth Camp Forester . . . . . . . . . . . . . . . . . . . . . . . . . . 3
  Youth Camp Foreman . . . . . . . . . . . . . . . . . . . . . . . . . . 5

CREW DESCRIPTIONS
  Landscape & Campground Maintenance Crew . . . . . . . . . . . . . . . . . . 6
  Forest Improvement Crew . . . . . . . . . . . . . . . . . . . . . . . . .6&7
  Carpentry and Building Maintenance Crew . . . . . . . . . . . . . . . . . . 7
  Clerical Crew . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 7
  Mountain Rescue Squad . . . . . . . . . . . . . . . . . . . . . . . . .7&8
  Hot Shot Firefighting Crew . . . . . . . . . . . . . . . . . . . . . . . 8

CREW LEADERS . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 8

CHIEF PUSH . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 8

HARD HAT COLOR CODES . . . . . . . . . . . . . . . . . . . . . . . . . . 9

ADMINISTRATIVE PROCEDURES:
  Working Hours . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 10
  Holidays . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 10
  Liaison Procedures . . . . . . . . . . . . . . . . . . . . . . . . . . 10
  Lunches . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 10
  Tours & Visitors . . . . . . . . . . . . . . . . . . . . . . . . . . . 10
  Compensation . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 11
  Project Reports . . . . . . . . . . . . . . . . . . . . . . . . . . . . 11
  Smoking . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .11&12
  Accidents . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 12
  Discipline . . . . . . . . . . . . . . . . . . . . . . . . . . . . .12&13
  Run-aways and Security . . . . . . . . . . . . . . . . . . . . . . . . 13
  Restrictions . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 13
  Grading System . . . . . . . . . . . . . . . . . . . . . . . . . . . . 13
    Grade Report . . . . . . . . . . . . . . . . . . . . . . . . . . . . 14

VOCATIONAL REHABILITATION . . . . . . . . . . . . . . . . . . . . . . . . 15
  Copy of Cooperative Agreement . . . . . . . . . . . . . . . . . . . . .16-18

SAFETY PROGRAM . . . . . . . . . . . . . . . . . . . . . . . . . . . . .19-21

PROJECT SPECIFICATIONS:

PLANTING SPECIFICATIONS . . . . . . . . . . . . . . . . . . . . . . . .22-25

THINNING SPECIFICATIONS . . . . . . . . . . . . . . . . . . . . . . . .26-27

Stream Fords . . . 53
Figure 5 . . . 58
Switchbacks . . . 53
Figure 6 . . . 59
Drainage . . . 53
Route Marking . . . 53
Figure 11 . . . 67

SELECTED BORROW . . . 54

WATER BARS . . . 60
Figure 8 . . . 61

ROCK DRAINS . . . 62
Figure 9 . . . 64

CULVERT PIPE . . . 63
Figures 10, 10A, & 10B . . . 64-66

TRAIL PUNCHEON . . . 68

LOG CULVERTS . . . 69
Figure 12 & 13 . . . 70

LOG BRIDGES . . . 71&72
Figure 14 & 15 . . . 73

MAINTENANCE OF TREAD . . . 74

MAINTENANCE OF TRAIL STRUCTURES . . . 74

CLEARING AND GRUBBING MAINTENANCE . . . 75

MAINTENANCE OF TRAIL DRAINAGE FACILITIES . . . 75

TREAD RESTORATION . . . 76

RECONSTRUCTION . . . 76

CFFP POSTER BOARD SPECIFICATIONS . . . 77

SPECIFICATIONS FOR PICKUP TRUCK BOXES . . . 78&79

SPECIFICATIONS FOR CHAINSAW BOXES . . . 80

SPECIFICATIONS FOR FIRE CACHE BOXES . . . 81&82

SPECIFICATIONS FOR FIRE PUMP BOXES . . . 83&84

HELIPORT SPECIFICATIONS . . . 85&86

HELISPOT SPECIFICATIONS . . . 87&88

TANKER FILLING SITE SPECIFICATIONS . . . . . . . . . . . (to be prepared)

VEHICLE OPERATION (Extract of Administrative Manual) . . . . . . . . . . . . . .89-101
- Required Equipment . . . . . . . . . . . . . . . . . . . . . . . . . . . 89
- Servicing and Repairing . . . . . . . . . . . . . . . . . . . . . . . . 90
- Vehicle Motor Numbers & Titles . . . . . . . . . . . . . . . . . . . . 91
- Accidents . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 92
- Inspection . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .92&93
- Preventive Maintenance . . . . . . . . . . . . . . . . . . . . . . . . 94
- Drivers Responsibilities . . . . . . . . . . . . . . . . . . . . . . .94&95
- Braking . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 95
- Faulty Starting . . . . . . . . . . . . . . . . . . . . . . . . . . . 96
- Use of Choke . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 96
- Safe Operation on Hills . . . . . . . . . . . . . . . . . . . . . . . .96&97
- Don't "Ride" the Clutch . . . . . . . . . . . . . . . . . . . . . . . 98
- Backing . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 98
- Parking . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 98
- Tire Care . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 98
- All Wheel Drive Vehicles . . . . . . . . . . . . . . . . . . . . . . .98-101
- Fire Tank Trucks . . . . . . . . . . . . . . . . . . . . . . . . . . . 101

# OPERATIONAL POLICY STATEMENT

All personnel will give first consideration to training, safety and rehabilitation of crew members in all phases of the work and training program.

The Chief Youth Camp Forester has the responsibility to assure that the work programs assigned to the four work crews are carried out in accordance with approved methods and specifications safely with the proper tools. He may at times personally supervise crews; however, he will conduct regular inspections of the work projects of all crews.

It is expected that Youth Camp crews will, at times, assist the Swan Forest Supervisor or other district personnel in carrying out district work projects. Requests for such crews should be made in advance to allow proper balance and scheduling of the regular Youth Camp work projects. Except for fire suppression activities, all district personnel will coordinate their requests for such assistance through the Kalispell District State Forester.

It is further contemplated that the Swan Forest or other district personnel may be assigned as a supervisor for the Youth Camp crews at times when regular personnel may be on leave or ill. The Chief Youth Camp Forester will make all requests for such assistance to the District State Forester.

The Chief Youth Camp Forester and his staff will report on crew activity, attend counseling and other meetings with the Youth Camp's Superintendent (and his staff) as requested.

The Chief Youth Camp Forester is responsible to determine that all required reports, records and requisitions are forwarded to the District State Forester in the usual manner.

Work Projects for Youth Camp crews other than those in this plan must have prior approval by the District State Forester and the Operations Chief. However, in the protection of life, limb, or property, the Chief Youth Camp Forester may assign work not in the annual work plan without prior approval.

In this case, he will report his action to the District State Forester as soon as practical. The Chief Youth Camp Forester may adjust the master plan with specific day-to-day planning to conform with available equipment, supplies, and inclement weather.

# JOB DESCRIPTION

CHIEF YOUTH CAMP FORESTER

## I. TITLE: Chief Youth Camp Forester

## II. EXPLANATION OF POSITION:

Under the supervision of the District State Forester supervises and carries out operational work projects. Projects may include fire hazard reductions after logging operations, timber thinning, tree planting, timber stand improvement, fire suppression and maintenance of roads, trails, and other improvements.

## III. AREAS OF RESPONSIBILITY AND PRINCIPAL DUTIES INCLUDE:

Assigning work projects to subordinates in carrying out the work plan for the Youth Forest Camp crews prepared by the staff.

Inspecting the progress of work projects to assure that approved methods, tools, and safety are being followed in the completion of work projects.

Maintaining discipline and security to the degree required by the Youth Camp Superintendent to minimize the possibility of enrollees taking unauthorized leave. Also to assure the orderly, safe, and businesslike completion of work projects.

Reporting unsatisfactory performance, conduct, or attitudes of subordinates or inmates assigned to the crew.

Keeping, documenting and forwarding time reports for men and equipment employed in completing work projects as required.

Supervising the training of subordinates and crews in the use of tools, methods and procedures and the fundamentals of fire suppression.

Performing other work as required.

## IV. DESIRED KNOWLEDGE, SKILLS AND ABILITIES ARE:

Thorough knowledge of methods, procedures and use of tools and equipment needed to complete work projects.

Recognition of the value of safe working methods and of practices and ability to convey this to the crew of inmates.

Good to excellent physical condition and adaptibility to outside work under varying conditions.

A degree in forestry from a recognized School of Forestry, requiring at least a four year course for graduation and considerable responsible experience in forestry work, including experience of at least ten years' experience in forest fire control work at supervisory levels emphasizing fire hazard reduction, timber stand improvement, fire suppression, construction and maintenance of roads, trails, and other facilities or improvements.

# JOB DESCRIPTION

YOUTH CAMP FORESTER

I. TITLE: Youth Camp Forester

## II. EXPLANATION OF POSITION:

Under the supervision of the Chief Youth Camp Forester, carries out the completion of operational work projects. Projects may include fire hazard reductions after logging operations, timber thinning, tree planting, timber stand improvement, fire suppression and maintenance of roads, trails, and other improvements.

## III. AREAS OF RESPONSIBILITY AND PRINCIPAL DUTIES INCLUDE:

Advising the Chief Youth Camp Forester on technical forestry matters.

Acting for the Chief Youth Camp Forester as assigned.

Providing immediate supervision to inmates of the Youth Forest Camp in completing work projects.

Keeping, documenting and forwarding time reports for men and equipment employed in completing projects as required.

Assigning various phases of the daily work to individuals in training individuals in the proper and safe use of tools and equipment.

Maintaining discipline and security to the degree required by the Youth Camp Superintendent to minimize the possibility of enrolles taking unauthorized leave. Also assure the orderly, safe, and businesslike completion of work projects.

Immediately reporting the absence of crew members to the supervisor of the Youth Camp.

Reporting unsatisfactory performance, conduct or attitudes of inmates assigned to the crew.

Performing other work as required.

Emphasis is on ability to gain confidence and cooperation of teen-age people and generate enthusiasm to effectuate the expeditious completion of projects.

## IV. DESIRED KNOWLEDGE, SKILLS AND ABILITIES ARE:

Thorough knowledge of methods, procedures and use of tools and equipment needed to complete work projects.

A working to thorough knowledge and understanding of the policies of the Office of State Forester in conjunction with a thorough knowledge of Montana statutes pertaining to forestry.

A working to thorough knowledge of regional silviculture and experience in all aspects of professional forestry work and forestry principles.

Considerable experience in approved fire suppression methods and training in the operation of all firefighting equipment employed.

A working to thorough knowledge of State land locations of Swan State Forest.

Good to excellent physical condition and adaptibility to outside work under varying conditions.

Recognition of the value of safe working methods and of practices and ability to convey this to the crew of inmates.

A degree in Forest Management from a recognized school of forestry requiring at least a four-year course for graduation, and considerable experience in the application of forestry techniques and a background of working with juveniles in a supervisory capacity.

# JOB DESCRIPTION

YOUTH CAMP FOREMAN

I. TITLE: Youth Camp Foreman

## II. EXPLANATION OF POSITION:

Under the supervision of the Chief Youth Camp Forester, the Youth Camp Foreman carries out various operational work projects. Projects may include fire hazard reduction after logging operations, timber thinning, tree planting, timber stand improvement, fire suppression and maintenance of road, trails, and other improvements.

## III. AREAS OF RESPONSIBILITY AND PRINCIPAL DUTIES INCLUDE:

Providing immediate supervision to inmates of the Youth Forest Camp in completing work projects. Requiring the use of approved methods, procedures, tools and safety in completing work projects.

Keeping, documenting and forwarding time reports for men and equipment employed in completing work projects as required.

Assigning various phases of the daily work to individuals, and training individuals in the proper and safe use of tools and equipment.

Maintaining discipline and security to the degree required by the Youth Camp Superintendent to minimize the possibility of enrollees taking unauthorized leave. Also to assure the orderly, safe and businesslike completion of work projects.

Immediately reporting the absence of crew members to the Supervisor of the Forest Youth Camp. Reporting unsatisfactory performance, conduct or attitudes of inmates assigned to the crew.

Performing other work as required.

## IV. DESIRED KNOWLEDGE, SKILLS AND ABILITIES ARE:

Emphasis is on ability to gain confidence and cooperation of teen-age people and generate enthusiasm to effectuate the expeditious completion of work projects.

Thorough knowledge of methods, procedures and use of tools and equipment needed to complete work projects for which employed.

Considerable experience in supervising semi-skilled to unskilled labor in carrying out work projects.

Recognition of the value of safe working methods and practices and ability to convey this attitude to subordinates.

Good to excellent physical condition and adaptable to outside work under varying conditions.

Education equivalent to that as represented by completion of a standard high school or demonstrate ability to meet foregoing qualifications.

## CREW DESCRIPTIONS.

Available boys from the Youth Forest Camp will be assigned to one of four normal work crews. These crews are:

1) Landscape and Campground Maintenance Crew
2) Forest Improvement Crew
3) Carpenter and Building Maintenance Crew
4) Clerical Crew

It is contemplated that some of the residents will not be available to the Work Program due to illness or internal administrative duties. Their number may vary from day to day. Normally it is estimated that a total of up to 38 will be involved in the Work Program each day.

There will be two special duty crews consisting of a Hot Shot fire suppression crew and a Mountain Rescue Squad. These boys will come from the various normal work crews and will serve on the Mountain Rescue Squad or Hot Shot fire suppression crew during training periods.

Each crew will be designated by a color-coded hard hat. The two stripes in front designate assigned crew. Each hard hat will bear the individual's full name dynotaped on plastic and attached to the center front of his hard hat. The hard hat will also contain the State Forestry emblem. If a boy is qualified in more than one crew, his hard hat would so indicate by bearing the colors of each of these crews. (See Hard Hat Color Code)

### LANDSCAPE AND CAMPGROUND MAINTENANCE CREW:

This crew will be at least eight to ten men who will receive special training in landscape design, grounds and recreation area maintenance and improvement, and sanitary engineering. Personnel selected for this crew should be those who meet the public well and are friendly and courteous. Crew members should have a sense of appreciation for natural beauty and an aptitude for plant and tree identification. They should be physically fit to do arduous manual labor. As these crews will at times work independently, they must demonstrate ability to work safely with tools and display initiative. At least three members should be able to qualify for a Montana driver's license.

### FOREST IMPROVEMENT CREW:

The Forest Improvement Crew will be composed of up to 30 men who will receive special training in identifcation of tree species, (dendrology) forest diseases, (pathology) forest insects,(entomology) tree vigor and the proper treatment for forestry problems. Training and skill in the tools used in Timber Stand Improvement work will be emphasized. Specialized training will also include preparation of thinned and logged areas for safe prescribed burning.

Personnel selected for this crew should be able to perform arduous work in all types of weather. They should have an appreciation of natural

resources and an interest in conservation and preservation. These crewmen will work under the supervision of a foreman, however, should be able to demonstrate the ability to work safely with tools and complete work projects without close, immediate supervision.

## CARPENTRY AND BUILDING MAINTENANCE CREW:

This crew will be composed of up to 6 men who will receive special training in carpentry tools and power tools such as the skill saw, drill, router and lettering guides The identification and use of the various woods available for construction will be emphasized. They will also be taught proper painting and staining procedures.

Personnel selected for this crew should have some knowledge and experience with basic carpentry tools and an interest in building things as well as an interest in the up-keep and repair of buildings and other facilities. A basic knowledge of mathematics is required so that the crewmen can be taught the procedures for measurement of items to be constructed. The foreman will normally provide close supervision, but when the enrollee's ability has been established, he may tackle certain tasks independently.

At least one member of this crew should be able to qualify for a Montana driver's license.

## CLERICAL CREW:

The Clerical Crew will consist of two to four men who will receive specialized training in communications including the use of radio, telephone and written messages. They will also be trained in preparing and maintaining reports, filing, office procedures and office maintenance.

Personnel selected for this crew should be concerned with personal appearance. They should be mentally alert and have an interest in business management and demonstrate the ability to remember and give importance to small details. Emphasis in selection of this crew should be to those who have had some training in typing and other business courses in their high school training. The crew at times will work with a minimum of supervision or independently, and must demonstrate ability to display initiative and undertake responsibility. These personnel will frequently meet the public and should present a pleasing, cooperative, helpful attitude.

At least one member of this crew should be able to qualify for a Montana driver's license.

## MOUNTAIN RESCUE SQUAD:

This crew will be composed of from 10 to 12 men to provide a well trained crew to help search for, administer first aid to, and rescue lost and injured individuals from mountainous terrain. Personnel will be selected from all Youth Forest Camp crews on the basis of 1) attitude, 2) willingness to train for an arduous task, and 3) physical development and stamina, including hiking, swimming, snowshoeing, skiing. This training will include the use of standard maps and compass, summer and winter survival including hiking, cooking, camping and advanced first aid. Specialized training will also include communications and rescue techniques in the mountains, water and motor vehicle accidents. Traffic control and traffic safety will also be taught.

This crew will normally work under direct supervision of one counselor and one foreman; however, due to the nature of the work, may become separated or detailed to special areas to search. These men, therefore, must demonstrate resourcefulness and initiative and effective use of the training received. Crew members should have a feel for remote areas such as sense of direction, lay of the land, natural barriers and assists to lost persons. In other words, "woods wise" with a recognition of natural dangers to human life, including weather.

## HOT SHOT FIREFIGHTING CREW:

This crew will be composed of 20 men who, in addition to being trained as members of the regular fire crew, will receive training in the use of special firefighting equipment such as fire tankers, chainsaws, and the proper use of water and retardants.

Personnel for this crew will be selected from all of the other Youth Forest Camp crews. They will be men who have 1) demonstrated a particular interest in firefighting, 2) are exceptionally well qualified physically for sustained physical labor, 3) who have rated high in the regular fire training program, 4) who have shown a satisfactory degree of cooperation and self discipline, and 5) who have indicated they are willing to undertake the advanced training necessary.

This crew will generally be under the supervision of a foreman, however, members must demonstrate ability to recognize safety hazards connected with firefighting and display initiative in solving suppression problems. The crew may at times be used in areas of the State at some distance from the Swan River State Forest. They must show willingness to perform fire suppression duties under any supervision assigned.

## CREW LEADERS AND ASSISTANT CREW LEADERS:

Crew Leaders and Assistant Crew Leaders will be selected by Youth Camp Counselors and Forestry personnel.

Crew Leader is to assist Crew Foremen in carrying out the work program and to act as "straw boss."

The Assistant Crew Leader is an understudy of the Crew Leader.

## CHIEF PUSH:

A Chief Push will be selected by all boys once each month. Counselors and Work Foremen will recommend boys eligible for Chief Push to the Director of Counseling, who will select four boys from those recommended to be voted upon. A boy cannot be a Crew Leader and Chief Push at the same time. His duties will include holding musters, appointing someone to say grace at meal time and announcing activities. He will receive an additional $.15 per day.

## HARD HAT COLOR CODES

All enrollees are to be issued a hard hat to be worn whenever on field forestry activities. Dymo tape will be placed on the hats to signify name of wearer; crew designation and special crew designation as follows:

Green - Landscape and Campground Crew
Orange - Forest Improvement Crew
Blue - Carpenter and Maintenance Crew
Yellow - Clerical Crew
Brown - Mountain Rescue Crew
Red - Hot Shot Firefighter Crew
Black - Individual name and title, if any

Except for the dymo tape, all hard hats shall remain silver in color. Boys will earn titles by virtue of their attitudes and performances. The title of the boy elected by the other boys will be Chief Push. His duties are related to camp activities only. He will be elected from a list provided by the Director of Counseling. Each crew will have a Youth Crew Leader and Assistant Crew Leader. These boys will be chosen by the Camp Counselors and the Chief Youth Camp Forester and his staff. Crew Leader and Assistant Crew Leader duties relate to crew assignment only. No enrollee will receive a dymo tape title until he has earned the right to wear it.

The purpose in utilizing the colored tape hat system is to provide outlets in the program which will allow individuals to receive recognition for their capabilities, particularly in the area of leadership, and be further aided in their maturation process through learning to adequately assume responsibility.

This system provides realistic goals for those boys displaying potential leadership ability to strive toward and achieve. They provide realistic training by acquainting such recipient of a colored tape hat with the many responsibilities he must assume as a leader.

# ADMINISTRATIVE PROCEDURES

## Normal Working Hours:

0800 hrs. (8:00 a.m.) to 1700 hrs. (5:00 p.m.) Monday through Friday, except holidays. (Lunch: 1200 - 1300 hrs.) (Includes travel, evaluation, tool issue and check-in)

Fire suppression crews will work as required by fire boss or fire foreman.

## Holidays:

The following are Legal Holidays as designated by 19-107 RCM, 1947:

Every Sunday
January 1, New Year's Day
February 12, Lincoln's Birthday
February 22, Washington's Birthday
May 30, Memorial Day
July 4, Independence Day
September, First Monday, Labor Day
October 12, Columbus Day
November 11, Veteran's Day
December 25, Christmas Day

Every day on which a general election is held through the State.

Every day appointed by the President of the United States or Governor of this State for a public fast, thanksgiving, or holiday.

If any of the holidays herein enumerated except Sunday, fall upon a Sunday, the Monday following is a holiday. All other days than those herein mentioned are to be deemed business days. It is expected that employees will take off these days as holidays.

## Liaison Procedures:

The Chief Youth Camp Forester will be the primary contact between the Office of the State Forester and the Youth Camp Superintendent. Further details of liaison are elaborated in the Operational Policy statement and in the various job loads involved. (See Work Plan)

## Lunches:

Normally, individual "sack" lunches will be packed brought to the various work sites by the boy He will be responsible for his lunch and its container during the day. Consideration of this responsibility and the conditions, hot lunches may be served, however, identical treatment of all enrollees must be a primary consideration.

## Tours and Visitors:

All tours must be cleared through the Camp Superintendent. No visitors will be allowed on the job unless prearranged with the Superintendent. Unauthorized visitors will be reported including make and model, color of cars and license, number of persons in the car, etc.

## Compensation:

The Department of Institutions will compensate each boy at the rate of 25¢ per day worked (more if budgets allow). This will include work on the internal administrative duties portion of the Work Program as well as that directly supervised by the Chief Youth Camp Forester and Staff.

The Office of the State Forester will supplement this basic daily rate for fire suppression work as follows: a) Hot Shot Fire Crew when called as a team -- at 25¢ per hour. b) Other fire suppression -- at 10¢ per hour. Foremen will report this time to the Camp Superintendent who will bill the Office of State Forester by letter. (This cost must also be incorporated in the Fire Report). A warrant to the Swan River Youth Forest Camp Boy's Account will be sent with a dollar breakdown for each boy.

## Project Reports:

In addition to the required reports listed on the Project Plan, a daily man-day tabulation procedure will be established to record the time spent on each project. This data will be transferred to monthly narrative reports as well as to the specific project report.

## Smoking:

Smoking regulations apply to the staff as well as the boys and are as follows:

1. There will be no smoking in the dining room of the food service building.

2. Smoking will be permitted in the kitchen, but must not be done while performing food preparation duties. The smoker will be seated and will use a clean ash tray and not lay the burning cigarette on an appliance or piece of equipment other than the ash tray.

3. Smoking will be permitted in the administration building. Please use clean ash trays.

4. Smoking will not be permitted in the sleeping area or the locker rooms of the main lodge building. Use clean ash trays and do not lay burning cigarettes on any furniture or equipment or part of the building. Smoking will be permitted in the remainder of this building.

5. Smoking will be allowed on the Camp Grounds proper. The smoker must be seated and not walking around or exercising in game. All cigarettes must be ground out or moistened until they are dead out and the butts carried to a trash can or ash tray. No butts are to be thrown on the ground.

6. Smoking will not be allowed in any vehicle while transporting boys on the work program or recreational and special events programs.

7. Smoking will be permitted on the job only during work breaks and lunch periods in designated areas.

Accidents:

A SUPERVISOR'S ACCIDENT REPORT (#128) will be prepared by the foreman for each accident to enrollees and will be transmitted to the Camp Superintendent for the individual's file.

Accidents on the job requiring medical attention beyond the capacity of the crew will follow this procedure:

Logical transportation of the injured enrollee will be made to the Camp Headquarters or as they direct. This may be with another enrollee or with Crew Foreman. If crew foreman is to accompany the injured, he will first collect the crew at one location and place the crew leader (an enrollee) in charge instructing the crew to sit and await his return.

Include reports of accident proneness in periodical evaluations.

Discipline:

In the event that appropriate reprimands or direct orders do not correct situations that develop, return violator to direct control of Camp Superintendent.

Use force only in self defense or protection of another boy. There is to be no corporal punishment.

Rules of conduct as stated in the Boy's Manual are:

1. Keep in mind, and in action, at all times, your personal safety and the safety of your campanions.

2. The destruction of State-owned property is prohibited.

3. Vulgar language is not allowed.

4. Running is not allowed at any time, except 1) when in the vicinity of a bees' nest, and 2) when in danger while fighting fire.

5. Fighting, horseplay, or throwing of tools and materials will not be tolerated.

6. Do not chop on snags or dead trees without permission from a foreman.

7. On work crews smoking is permitted during breaks and lunch period only.

8. No reading material or pocket radios will be allowed on the job.

9. No loafing is permitted; work at a steady pace. There will be no sitting or lying down during work hours unless so instructed by your foreman.

10. Do not leave your work area for any reason without permission from the Foreman.

Run-aways and Security:

Foresters and foremen will have to keep a constant mental count for driving as well as security.

Run-aways will be immediately reported to the Camp Superintendent giving point last seen, direction and mode of travel, description of clothes.

Restrictions:

Foresters and foremen must clearly understand:

a.) They cannot mail any letters for any boy.

b.) They cannot obtain any contraband such as liquor and cigarettes.

c.) They cannot play any favorites.

d.) No harboring or hiding anything the boys do.

Grading System:

Enrollees will be graded in two areas--on the job and in camp. His previous week's grade average may determine how many special activities he can participate in.

On the job, work foremen will report each assigned enrollee's performance on the following form.

At the beginning of each work day the crew member starts with a grade of 0. Crew members can earn up to 5 points for a day's work. A grade of zero is very, very poor, and a grade of 5 is very, very good. Each will be graded on the following items:

Safety habits
Conduct
Production and quality
Effort

All these add up to attitude. In camp he will be graded on items such as appearance, getting along with other boys, cooperativeness, performing routine jobs and progress. The work and camp grades will let him know how he compares with other boys, which areas need attention, areas that are good and how he is progressing toward eventual placement. An average grade of 3 means he is doing just average, anything below should be of concern and an effort made on his part to improve. If he maintains average grades, he will have no restrictions.

GRADE REPORTS:

## WORK REPORT
(COMMENTS ON BACK)

Name ______________________ Foreman ______________________

Crew ______________________ Date ______________________

| | M | T | W | Th | F |
|---|---|---|---|---|---|
| Safety | | | | | |
| Effort | | | | | |
| Production | | | | | |
| Conduct | | | | | |
| Average | | | | | |

Weekly Work Average __________

## CAMP REPORT
(COMMENTS ON BACK)

Name ______________________ Counselor ______________________

Date ______________________

| | M | T | W | Th | F |
|---|---|---|---|---|---|
| With peers | | | | | |
| Attitude | | | | | |
| Conduct | | | | | |
| Self | | | | | |
| Average | | | | | |

Weekly Camp Average __________

Final Grade __________

# VOCATIONAL REHABILITATION

The Chief Youth Camp Forester and his staff will assist in achieving the purpose, goals and objectives set by the legislature in the establishment of the Swan River Youth Forest Camp.

The primary purpose of vocational rehabilitation is to be work evaluation, training, and the development of social skills to adequately prepare the youth for entrance into competitive and renumerative employment. The State Forester's staff will help evaluate youth in terms of their potential, additional training needs or job placement by the Division of Vocational Rehabilitation.

The goals of Vocational Rehabilitation program will be to accurately 1) evaluate, assess, and improve the emotional stability of the enrollee, 2) develop their work potential and skills to the utmost capabilities by training in the areas of forestry, heavy equipment operation, clerical, laundry, kitchen services and general grounds maintenance, and 3) develop social practices with emphasis placed on independent living within the community.

The State Forester's staff should give first consideration to the purpose and goals outlined above in carrying out the work program according to the plan. If a youth does not "fit" in a crew assignment, he should be given an opportunity to try his ability at other jobs until he and his counselor feel he will develop properly. The youth's development and future should be given first consideration at all times. Particular attention should be given to his attitutde toward work, his supervisor and his fellow workers.

Supervisory personnel will provide on-the-job counseling to assist the youth, recognize personal problems and assist him in working them out. The Chief Youth Camp Forester and his staff will meet with the Youth Camp Superintendent, as requested, for the purpose of assessing and evaluating individual youths and/or the total project. Representatives of other interested agencies such as the Fish and Game Department may be invited to conferences and staffings for exchange of information and to further a better understanding of the goals and purpose of the Youth Forest Camp.

The facilities of the Swan River Forest Headquarters are to be made available for youth training and orientation. Any personnel of the Office of the State Forester with special talents for training or professional specialties may be called upon to assist in training or orientation sessions. The Chief Youth Camp Forester will provide information to interested people to make known the nature and scope of the activities of the Youth Forest Camp.

COPY OF

# COOPERATIVE AGREEMENT BETWEEN THE DIVISION OF VOCATIONAL REHABILITATION, THE MONTANA BOARD OF INSTITUTIONS, AND THE MONTANA STATE FORESTER

PROJECT: A Rehabilitation Facility for Residents of the Swan River Youth Forest Camp

## (A) PURPOSE

This project will be a joint project between the Division of Vocational Rehabilitation, the Montana Board of Institutions, and the Montana State Forester. It is increasingly evident that a considerable number of youthful public offenders are in need of work evaulation, training and development of social skills in order to adequately prepare them for entrance into competitive and remunerative employment. Since the State of Montana does not have a facility for this development of the young juvenile delinquent, it is the prime purpose of this project to develop such a program at the State Forestry Camp. It is the purpose of this project to equip and staff the camp to provide this type of service. The client group will consist of young men between the ages of 16 and 21. These clients will engage in curriculum which will enable them to develop the above mentioned skills. There will not be a definite time limit in terms of program participation. Any client who has been evaluated and shows potential will be offered further training or job placement by the Division of Vocational Rehabilitation.

## (B) GOALS

The goals of this project will be to more accurately 1) evaluate, assess, and improve the emotional stability of the client; 2) develop the work potential and skills of the clients to their utmost capabilities by training in the areas of forestry, heavy equipment operation, clerical, laundry, kitchen services and general grounds maintenance; and 3) develop social practices with emphasis placed on independent living within the community.

## (C) BACKGROUND AND NEED

Because of the lack of a facility of this nature within the state, it has been necessary to keep the young public offender either at the Pine Hills School, which does give academic training to these young men, or to allow them to return to society without any vocational preparation. As a result of the lack of any vocational preparation many of these young men have found their way to the State Penitentiary. It is the feeling of these agencies that with a certain amount of evaluation, training, counseling and guidance, these young men can be placed in the community and helped to lead a more productive life. It is hoped that this assistance may prevent them from returning to their delinquent behavior.

(D) THE MONTANA STATE BOARD OF INSTITUTIONS AGREES TO:

1. Make available at no cost all medical and psychiatric information which has been collected at the Pine Hills School for the purposes of developing eligibility for Division of Vocational Rehabilitation assistance.

2. Designate a counselor to review the social background of the client and to assist in social development which is felt to be necessary to strengthen and enhance his employability

3. The After Care Department will assist in the investigation of job opportunity, placement and follow-up, working closely with the Division of Vocational Rehabilitation.

4. Conduct regularly scheduled staffing of all clients involved in this progress of the client and make further recommendations.

(E) THE STATE FORESTER AGREES TO:

1. Provide physical space for the project for the Swan River Forestry project.

2. Provide staff for training, orientation and consultation as needed.

3. Provide necessary forestry equipment and materials as needed for training.

4. Provide the use of the Swan River Forestry headquarters for training and orientation.

(F) THE DIVISION OF VOCATIONAL REHABILITATION AGREES TO:

1. Assign a vocational rehabilitation counselor to the Swan River Forest Camp to assist and participate with the Swan River Camp personnel, as well as the State Forestry personnel, in their assessment of the work potential of each resident.

2. Assist in the investigation of job opportunities, placement and follow-up, as well as working closely with the Board of Institutions After Care Department.

(G) THE THREE PARTIES JOINTLY AGREE TO:

1. Place these clients at various training stations and evaluate them, and if necessary change them from station to station until a definite ability is shown and then place them in this training area for additional training.

2. Conduct regularly scheduled staffing of all clients involved in this program in order to review and assess the progress of the clients and make further recommendations.

3. Participate individually and/or collectively in costs of staffing, equipment, and case service as pertinent.

4. Invite representatives of other interested agencies to conferences and staffings for exchange of information and development of further understanding.

5. Promote educational and special information programs which will be designed to make known to the general public the nature and scope of the activities of this project.

6. All responsible persons of these three agencies will meet periodically for the purpose of assessing and evaluating the total project.

MONTANA STATE BOARD OF INSTITUTIONS

DATE: March 29, 1968

/S/ E. G. Kellner
State Director

DIVISION OF VOCATIONAL REHABILITATION

/S/ Gareth C. Moon
State Forester

/S/ J. C. Carver
State Director

# SAFETY PROGRAM

## The Problem:

An analysis of the accident reports within the Office of the State Forester indicates the need for a vigorous safety program that will reach every person. Most of the reported accidents have happened to the seasonal workers. While this will come as no surprise, it does show that we need a safety program that reaches the crew in the woods. Two types of accidents appear common a) cuts from axes and b) bruises from trucks, limbs, and such. The most serious lost time accidents have been due to poor care at the time of injury which leads to infections and even lockjaw.

The severity factor enters here, but it seems that we have been lucky. Our men loose a lot of time due to lots of cuts and bruises, but each only accounts for a little lost time. Apparently the wounds have been better cared for as less time is lost in the average injury. This could well reflect the first aid training.

## The Program:

Accident prevention must be made a routine part of all work. It will take emphasis, time and perhaps some money, but safety made part of the job will eventually save both time and money. It must be more than the casual display of posters, the showing of safety films, lectures, or inspections by safety personnel. It is application of tried and tested procedures backed by the sincere and personal support of every man from the top to the bottom.

Set up an inspection system, or better, a routine. This could come as we keep track of conditions and work practices on an organized basis. Inspections should be made, reported and followed up. These inspections need not be by any one person, but should include all overhead personnel, industrial accident people and the like.

Give job instruction. The more menial the job the more rapid the turnover, the greater the need for the instruction and supervision. This need not be a formal class, but might include some. The buddy system with new men has proven worthwhile and should be used.

The employees will have to be motivated. We will have to show them the purpose of safety. Responsibility for safety must be instilled in all our supervisors. No one can be forced to work safely; he has to be persuaded. The implementation of a planned campaign can take into account part of this motivation through awards and the like.

The whole system has to be followed up. From the analyzation of accidents to the motivation for avoiding them. The pressure for safety ought to be constant beginning at the top.

The whole departments' interest in preventing accidents is sincere. Neither the employer or the employee can afford the losses that accompany an accident.

We have tried to make things as safe as possible. As new hazards are discovered, corrective measures will be taken.

Each person should report all unsafe conditions encountered in his work.

No employee is expected to undertake a job until he has learned to do it and is authorized to do so by his foreman

All injuries must be reported immediately.

Compliance with safety rules, (wearing hard hats, etc.) is a condition of satisfactory performance.

(Extract of Boys' Manual:)

## GENERAL SAFETY RULES

1. THINK and WORK safely. Safety is the most important part of the work program.
2. REPORT ALL ACCIDENTS TO A FOREMAN, NO MATTER HOW SMALL.
3. Do not stand in vehicles while in motion. No loading or unloading while the vehicle is in motion.
4. Wear your hard hat at all times while on work duty with the OSF. Wear other protective clothing as required.
5. Each tool, piece of machinery and job has its special safety requirements. Know and follow them.
6. If you don't know how to do a job, and do it safely, ask your foreman.

## SWAN RIVER YOUTH FOREST CAMP SAFETY CODE

WOODS WORK, IF YOU LET IT, CAN BE EXTREMELY DANGEROUS!

### SAFE PRACTICES

ALWAYS USE SAFE PRACTICES AND HELP MAKE THE ENTIRE JOB SAFE. WATCH OUT FOR THE SAFETY OF OTHER BOYS.

### PERSONAL

BE IN GOOD PHYSICAL CONDITION BEFORE STARTING WORK. KEEP YOUR MIND ON YOUR WORK. WATCH DAY DREAMING. HORSEPLAY, SCUFFLING AND PRACTICAL JOKES ARE NOT ALLOWED. ALL INJURIES, NO MATTER HOW SLIGHT, MUST BE REPORTED.

### PROTECTION

WEAR PROTECTIVE CLOTHING AND EQUIPMENT WHEN NEEDED AND KEEP THEM IN GOOD CONDITION. USE ALL SAFEGUARDS PROVIDED. ALWAYS USE THE RIGHT TOOL FOR THE JOB AND KEEP THE TOOLS IN SAFE CONDITION.

### WORK AREA CONDITIONS

UNSAFE CONDITIONS MUST BE REPAIRED OR REPORTED TO YOUR FOREMAN.

### YOUR ACTIONS

ALWAYS LIFT CORRECTLY. TAKE STRAIN WITH YOUR LEGS, NOT YOUR BACK. STAY AWAY FROM MACHINERY AND EQUIPMENT UNLESS YOU HAVE SPECIAL PERMISSION OR IT IS YOUR DUTY TO OPERATE THEM.

### KNOW HOW

DO YOUR WORK THE RIGHT WAY. TAKING THE SHORT CUT IS OFTEN HAZARDOUS. ALWAYS FOLLOW INSTRUCTIONS. IF YOU DON'T KNOW HOW TO DO A JOB, ASK YOUR FOREMAN.

### PAY ATTENTION

PAY ATTENTION TO THE SAFETY INSTRUCTIONS PROVIDED BY YOUR FOREMAN FOR EACH JOB.

# PLANTING SPECIFICATIONS

(The following specifications have been adapted for use on State Forest Land from the Agricultural Conservation Program Practice A-7)

Definitions:

Interplanting: planting of seedlings among existing forest growth in areas poorly stocked with trees.

Replanting planting of areas on which all, or substantially all, of successfully planted trees or plants have been destroyed by accidental fire, diseases, insects or prolonged or severe drought.

Guides and Specifications:

1. Assistance of a professional forester is required.

2. Preparation of Area to be Planted: Unless otherwise specified by the forester, all lands where topography and ground cover permit, including cropland, shall be summerfallowed and clean cultivated for 1 year previous to planting. The purpose of such cultivation shall be to kill out noxious and other weeds and grass in which trees generally cannot be successfully established.

a. Effective temporary soil sterilants may be substituted for cultivation or used in combination with cultivation in the elimination and control of undesirable vegetation. However, the method used must be approved by the forester, and must produce land which is practically free of perennial weeds and grass before trees are planted.

b. On areas that cannot be summerfallowed and grass is present, plow shallow furrows and plant the trees in them. If plowing furrows is not practical, scalp or remove such growth for at least 1 foot around the spot where the tree is to be planted.

c. When trees are planted in furrows, the operation must be performed on the contour as nearly as practical. When soil is scalped by machines to prepare a planting site or to eliminate competing growth, the work be done in such a manner that the operation does not leave furrows or depressions that may become gullies or channels, thus increasing rather than minimizing erosion of soil.

3. Clearing Land for Tree Planting:

Land occupied largely by brush or undesirable trees of no economic value may be cleared to permit planting of desirable tree species.

a. The area to be cleared must be approved by the forester as to need and practicability of the practice. Federal cost-sharing will not be made until the cleared area has been planted to an approved species of trees in accordance with the specifications of that practice.

b. The forester will advise on the method of clearing to be followed, use of effective herbicides, and other approved mehods. He will indicate the measures necessary to prevent erosion and the species and number of trees to be planted.

4. What to Plant:

Tree species normally found growing in the vicinity (native species) or those known to be satisfactory for the area shall be planted. Species planted must be approved by the forester. Nursery-grown planting stock produced from seed of local or adaptable origin should be used.

5. Number of Trees Per Acre:

Initial plantings should be on the basis of about 900 trees per acre. This is a spacing of 7 feet by 7 feet which will provide adequate stocking after expected losses on planted areas. The forester will determine the number of trees per acre when interplanting or replanting and may prescribe other spacing for initial plantings.

6. When to Plant:

Planting should be done only when trees are dormant. Ordinarily early spring planting, as soon as weather will permit, gives best results. Order planting stock early for delivery the following spring.

7. Care of Trees From Time Received Until Planted:

Careful handling of trees is essential. They can be kept in the package for several days if kept moist and cool. If planting is delayed longer than several days heeling-in is desirable. Follow instructions in Tree Planting Guide.

The roots of trees, especially evergreens, should never be allowed to dry out during planting or be exposed to the sun or wind for more than a few seconds. Evergreen roots are covered with tiny root hairs that are extremely susceptible to drying. Exposure for a short period of time may result in the death of the tree.

8. Planting the Trees:

a. Avoid planting on hot, windy days because loss of tree moisture is greatly increased under these conditions. Trees lose water content rapidly when roots are not in contact with a source of moisture such as damp soil. Take advantage of any available shade, such as the north side of stumps, logs, or depression in selecting the spot to plant a tree.

b. Planting can be done with a planting machine, shovel, grub hoe, mattock, planting mattock, or bar. Dig a hole sufficiently deep so that the roots can be placed in it without folding or crowding. Plant the trees at about the depth they were in the nursery. Pack the soil firmly around the roots in order to eliminate all air pockets. Air pockets will prove fatal to the tree in most cases. If a planting machine is used, this firming is done by the packing wheels.

c. Planting with a mattock should be as indicated below:

(1) Drive mattock in full length and as near perpendicular as possible.

(2) Raise up on handle, opening bottom of hole.

(3) Pull back upper part, making a clean square hole.

(4) Place roots straight down in the middle of the hole. Have tree the same depth it stood in the nursery.

(5) Drive mattock again adjacent to the tree hole.

(6) Push a portion of dirt into the hole, packing it firmly around the lower roots.

(7) Finish filling the hole and tamp firmly with the back of the mattock. One or two strokes are sufficient. Avoid excessive tamping.

(8) Pack the upper part. This tree is set correctly.

d. Planting machines are available and do a good planting job where topography and ground cover permit. The same care of trees and careful planting is as essential for machine planting as for hand planting. Planted trees should be checked occasionally as planting progresses to see that the trees are well planted and the soil is properly compacted.

9. Care and Survival:

a. There should be no grazing by domestic animals in plantings. Fencing is recommended but is not required if destructive grazing can be prevented without fences.

b. All reasonable precaution must be taken against the occurrence and spread of destructive fire in planted areas.

c. Where topography and ground cover permit, plantings shall be cultivated at least twice annually and kept reasonable free of weeds unless otherwise specified by the technician. Cultivation is required on irrigated plantings until trees are large enough and old enough to compete successfully with the rank weed growth which is certain to follow cessation of cultivation. Cultivation thereafter, for best results, will be desirable and is strongly recommended.

d. The application of approved weed control chemicals and at rates recommended by the forester can be used to supplement mechanical cultivation. Applications will be limited to a strip extending approximately 18 inches on each side of the tree row.

10. The harvesting of Christmas trees by thinning from forest plantings is not prohibited if the trees to be left until maturity will provide the desired long-term conservation benefits. Harvesting, which destroys the planting or makes it ineffective in soil protection, is considered failure to maintain the practice, or as a practice defeating the purpose of the program.

11. If shrubs are used, those that benefit wildlife should be given preference whenever practicable.

12. Plantings must be protected from destructive fire and destructive grazing.

13. Federal cost-sharing will not be allowed for planting orchard trees or ornamental trees.

14. A check of the planted trees and shrubs at the end of the first growing season should show a minimum survival of about 70 percent as well spaced healthy living trees. Replanting should be done the following spring if survival was below the above standard or if blank spaces on the planting developed.

15. Refer to Northern Region Cooperative Forest Management Handbook and Tree Planting Guide, Cooperative Extension Service, Montana State College, Bozeman, Folder 74.

16. The above are general measures. Some plantings may require some additional or special measures. When required they will be specified in writing, by the District State Forester.

# THINNING SPECIFICATIONS

(The following specifications have been adapted for use on State Forest Land from the Agricultural Conservation Program practice B-10 - Sub practices - Thinning and Release of desirable seedlings and young trees)

Generally, only stands averaging less than 10" DBH will qualify for a thinning practice. Stagnated "dog-hair" stands under 4" should be considered for a release practice.

Guiding principles for these practices:

a. The project area must be protected from destructive fire.

b. Fire hazards in slash resulting from the practice must be abated as directed.

c. The tract should be protected from soil compaction and root injury by livestock; and where seedlings are present or needed, protection from destructive grazing will be required. Use of the thinning area by livestock should be discouraged where overgrazing is resulting in damage to the site or to reproduction.

d. Special care must be taken to avoid local epidemic insect buildup in the thinning slash. It is advisable to discontinue thinning from April to September to prevent Ips infestations.

e. Areas of insect or disease infestations should be closely examined to determine if a sanitation thinning can adequately meet the problem. A thinning practice can be approved only where it appears that such treatment will be successful.

## THINNING

Thinning is used in immature stands where a reduction in the number of stems and proper spacing will increase volume increment of crop trees and shorten the length of time needed to grow merchantable crops.

1. The thinning practice priority will be given to the following cover types:

a. Ponderosa Pine

b. Douglas-fir

c. Western Larch

d. Lodgepole Pine

2. Give preference to medium or better sites and stands under 60 years of age.

3. Leave trees should be of good form and vigor and free from disease and insects. Leave trees are the final crop trees, plus additional trees of good form and vigor that will not be serious competition during the next 10 years.

4. Thinning will be based on excess basal area stocking for the applicable type, site and age.

Maximum basal area to leave per acre and maximum number of trees to leave per acre by various age classes and site indexes should be in conformance with the graphs on pages 71, 72 and 74 of COOPERATIVE FOREST MANAGEMENT POCKET GUIDE. (Division of State and Private Forestry; Missoula, Montana; July 1965)

5. The installation of a sample marked area with the project foreman or his representative is an important phase. It will furnish a ready reference on which to base the entire operation and a check point for the foreman to use in keeping work in conformance with instructions.

6. Special attention must be given to the slash disposal treatment to be sure requirements have been met. Minimum hazard reduction requirements:

a. A 1-chain wide strip must be piled and burned along the edges of all well traveled roads.

b. Slash from the remaining treated area must be lopped and scattered.

c. Additional work may be required by the District State Forester to meet specific needs.

## RELEASE OF DESIRABLE SEEDLINGS AND YOUNG TREES

To eliminate brush and sapling growth in competition with established seedlings or young trees of desirable species.

1. This practice will generally be restricted to the following type of stand:

a. Stagnated.

b. Relatively young and with diameters usually small enough so trees can be removed by a brush-hook or one swing of an axe.

c. No established dominance by components of the stand.

2. The release practice should not be authorized where a thinning is actually required.

3. This practice may be applied to the removal of competing brush, suppressed trees and "dog hair" stands.

4. Number of stems to leave after release is not less than 300 or more than 700 trees. (See maximum basal area and maximum number of trees to leave as referenced above).

## ROAD MAINTENANCE SPECIFICATIONS

Maintenance engineering techniques are developed largely by experience. Local soils, climate conditions, traffic volumes, availability of materials, and other factors influence maintenance methods. The primary objectives of State Forest maintenance must be to insure that drainage and soil stabilization measures are adequate. Roadbed surface maintenance is given secondary consideration.

It is essential that annual maintenance work does not automatically become routine. Each road is reviewed at least once each year for its current status and needs. This is done without reference to what may have been done last year. Also, new methods and equipment are tested on a continuing basis in order to insure that the best methods are in use.

Surface Maintenance. Care of the surface (traveled way) is usually the most expensive feature of road maintenance. This is especially true on roads which have been in use for several years since the last construction or reconstruction was accomplished.

Motor-Grader Use. On unpaved roads most of the normal surface maintenance is accomplished with a motor grader. This machine corrects displacement of surfacing material resulting from either traffic or erosion. It also reshapes the roadbed to its original cross section and provides a smoother roadbed surface.

Neglect of timely surface maintenance will result in loss of cross section and the displacement of any imported surfacing beyond the point of economical recovery. Excessive surface rutting or distortion becomes expensive to repair and the use of heavier equipment may be necessary.

Conversely, the tendency to over maintain is avoided. The use of a motor grader on a forest development road for the sole purpose of providing a smoother and more comfortable roadbed for traffic seldom can be justified economically. On lightly traveled roads the growth of grass outside the wheel tract area is an erosion preventive and is not removed unless necessary. In this situation mowing is cheaper and more effective than blading.

Spot Repairs. This type of maintenance is a frequent requirement on all roads, but more especially on newly constructed or recently surfaced jobs. While the need for spot repairs may develop from a number of basic causes, the principal reason is subgrade failure. It is also true that the principal reason for subgrade failure is ineffective drainage. Even though surface failure may be due to other deficiencies, the basic trouble usually lies below the surface. In all cases the cause as well as the effect is treated. This is the only means of preventing repetitive failures.

Paved surfaces may require spot maintenance through structural failure of the pavement rather than subgrade deficiencies. These are removed and replaced with suitable patching. In some instances the reason for failure cannot be identified until the failed surfacing has been removed, the broken pieces or removed material examined, and the subgrade checked. The cause determines the remedy.

Surface Replacement. Unstabilized surfacing materials usually must be replenished at periodic intervals. Unstabilized surfacing is reinforced by adding new material and providing for compaction by traffic. This is usually done on a project basis before the wearing course is completely worn out. However, it should not be done until the amount of material to be placed reaches a volume such that unit costs will be reasonable.

Stabilized wearing surfaces are usually reinforced by ripping up the metal in place, adding additional material, and recompacting. This is especially true for bituminous type stabilization during the first few years of service. Later this type of surface may be strengthened or traffic displacement corrected by the addition of asphaltic concrete directly to the surface.

Pavement Repairs. Except for spot repairs previously mentioned, pavement maintenance consists primarily of keeping all cracks filled to prevent the passage of surface water into the subgrade. This is accomplished with hot-poured bitumen or proprietary crack-filling compounds.

Shoulder Maintenance and Sideslope Maintenance. The most effective and economical maintenance for any should area not covered by road metal is a growth of sod or other suitable vegetative cover. Long-range maintenance plans are aimed at this objective. Newly constructed roads, or others with unstable cross sections, may need frequent blading to correct displacement by traffic or erosion until a permanent status can be reached.

Fill sections, which have properly stabilized slopes, need initial shoulder maintenance between the traveled way and the beginning of the sideslope, only. So long as the road has an unstabilized surface it will probably be necessary to use the maintainer in redistributing material which has been thrown or washed onto the shoulders. This precludes the growth of shoulder vegetation. If the soil is highly erosible it may be advisable to cover the shoulders with a special type of protective surfacing. For roads with stabilized surfaces and in areas where grass can be grown, the shoulders are seeded or sodded at the earliest opportunity.

In cut sections the same situation will prevail for the area between the traveled way and the beginning of the sideslope. On new roads it may be necessary to use the blade maintainer for ditch cleanout but this requirement is considered an expedient only until the backslope, ditch, and sideslope are stabilized and, whenever possible, covered with vegetation.

When it becomes practical to establish vegetative cover, fertilizing, reseeding, or other treatment to keep it in good condition is in order. Tall grasses are kept mowed. In most areas mowing will promote the growth of shorter, more densely rooted types.

While the importance of this growth cannot be overemphasized, it must give way at one point. Even though it may mean the removal and replacement of desirable vegetative cover, shoulders are bladed whenever necessary to provide for the rapid discharge of surface water from the traveled way. This is an essential requirement for all roads regardless of the type surface.

Serious traffic hazards may be created on road shoulders by erosion ruts, sheet erosion, sloughing, or any other type displacement, especially on new roads. The cause is determined and correction planned accordingly. Development of these hazards on actively traveled roads is checked as quickly as possible by the most appropriate method.

Roadside Maintenance. Roadside conditions establish roadside maintenance requirements. It will be assumed that clearing and grubbing, performed under construction operations, were appropriately done in accordance with the Construction Specifications. Possible subsequent changes in vegetative conditions, whether by reason of growth or failure of vegetation, will influence work requirements.

Appearance. When the adjacent land is under State ownership, maintenance is pointed toward blending the roadside cover type into the surrounding area with as little change as possible. There are exceptions such as when roadside areas must be given special treatment to prevent erosion, provide greater visibility, or reduce fire hazards.

Protective Cover. The need to prevent erosion is of the highest priority. When grass is not suitable, the growth of other vegetative cover types is promoted. Any type selected should be chosen for its hardiness and dense root system, and should not grow to a height that will require excessive mowing to maintain visibility.

The growth of trees in roadside areas is developed judiciously. A tree-shaded road presents a pleasing appearance and for esthetic reasons is most appropriate. However, trees may obscure visibility, interfere with drainage, or create excessive costs when the road is widened or improved. Excessive shade may prevent unsurfaced roads from drying out and permit retention of ice and snow on the road surface.

Visibility Protection. Visibility is maintained by cutting back the taller grasses and weeds and also, when necessary, by removing brush and lower limbs of adjacent trees. In some areas, this also may prove to be a fire-prevention measure. Mowing is a suitable method in most areas and is desirable in that it does not seriously damage the erosion-preventive capability of the cover. For this work there are now several types of self-propelled, power-driven highway mowers on the market.

Chemical control of roadside brush is standard practice where vegetation is a continuing threat to roadside clearance and sight distance. Chemical treatment has proved cheaper than mowing and destroys broadleaf growth (including small trees) but does not affect grasses. If chemical sprays are applied before the young broadleaf species are too large, the results are not detrimental. In fact, grass growth is enhanced because of the elimination of competition with broadleaf species. First-year spraying often results in a temporary unsightly condition. However, the dead material usually settles after the first or second winter, and new vegetation covers it. Chemical control of roadside vegetation usually eliminates the screen of brush and low-branch growth on large trees, permitting better sight distance along the road and a view of the roadside. (An instruction manual titled Roadside Spraying With Chemicals issued by Region 7, U. S. Forest Service contains valuable guides.)

Tree trimming for visibility is done by hand, using axes, saws, or power saws So long as desirable growth is not damaged or destroyed, the job is done in such manner as to deter the need for repetition as long as possible.

Drainage Maintenance. This is especially important on newly constructed roads. If a road has been properly designed and constructed, drainage features requiring maintenance will be at a minimum. However, there are sometimes developments during the first year that must recieve attention and possibly post-construction funds to correct them. These are principally:

1. Erosion of natural fine material at culvert outlets caused by increase in velocity when channel is restricted to culvert size. Usually this can be corrected by backfilling with rock.

2. Minor debris from clearing operation or slough from new backslopes collecting at culvert inlets.

3. Ditch or other erosion in fine materials. Usually this can be remedied by backfilling eroded area with coarser materials.

4. Usually, soft spots can be remedied by excavation of unsuitable material and replacing with suitable type of in some cases by use of drain tile.

5. Riprap of areas where stream action has caused loss of materials.

The above listing is not intended to be all inclusive but can be considered as an initial checklist until additions or deletions can be based on actual field examinations.

Other than correcting inherent problems drainage maintenance involves keeping ditches, culverts, tile lines, structures, and appurtenances like drop inlets, debris dams, and catch basins clean and ready to carry the next flow of water. Silt deposited during heavy flows at points likely become obstructions is removed. Brush, branches, roots, and other debris which has collected at culvert entrances, etc., is removed. Eroded channels are repaired and treated to prevent recurrence. Unusually severe storm damage may require extensive repairs to the drainage system. The complete inability to predict either the magnitude or frequency of major storm damage requires a large degree of flexibility in any program of maintenance for road drainage facilities.

Snow Removal. Except for emergencies where life or property may be endangered, snow removal activity by the Office of State Forester is limited strictly to the minimum amount necessary to support our activities. This applies to such items as entrance roads and driveways at accupied stations, roads necessary for the travel of our work crews, and roads used in custodial or protective emergencies.

Maintenance for Safety. Safety features of a road are considered and provided during design and construction. Maintenance is responsible not

only for preservation for the safety features which have been included in the original construction, but also for the development and installation of any supplementary safety features that may be needed.

Insofar as moving traffic is concerned, the best safety measure is adequate signing. Maintenance of permanent signs and installation and removal of temporary signs are a maintenance responsibility and such work is for direct accomplishment by maintenance personnel.

Other safety requirements which are classified as maintenance work are listed below:

1. The removal of snags and dead or insecurely rooted trees that may fall onto or across the traveled way.
2. Protection barriers against loose rock or unstable banks.
3. Sanding or warning against icy sections.
4. Removal or compaction or large amounts of loose material on the traveled way.
5. Dust prevention during period of heavy traffic.

## OPEN TOP CULVERTS:

Consists of open top timber culverts of the types, dimensions, and designs shown on the drawings, furnished and installed at the locations shown on the plans, in conformity with the lengths, lines, and grades staked on the ground by the forests and in accordance with these specifications.

All timber shall be grade 2 or better, fir or larch, cut to the dimensions shown in Figures 1 and 2 of the Construction details.

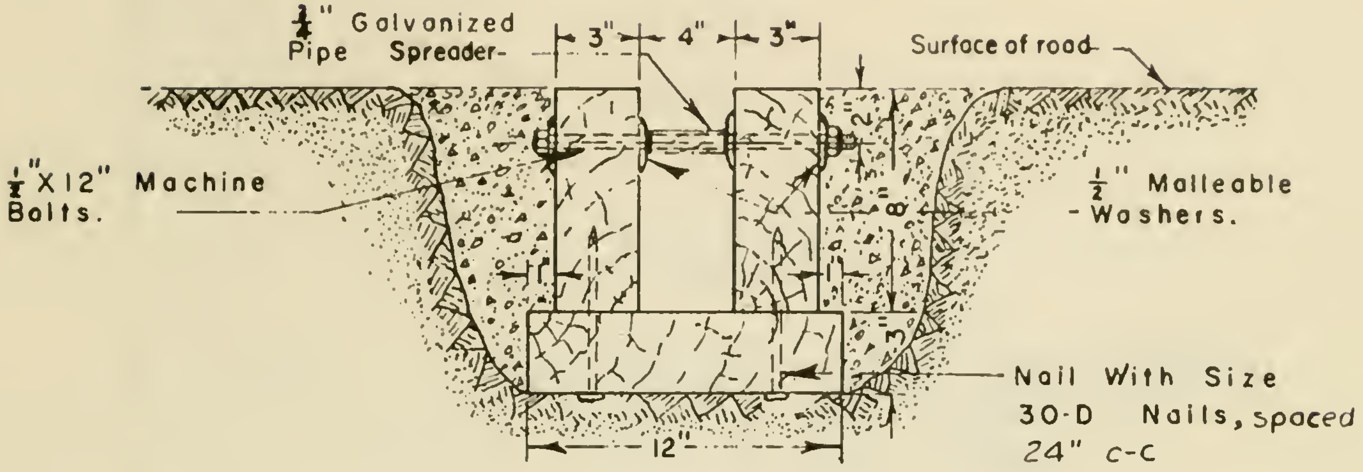
Machine bolts to be furnished may be either wrought iron or medium steel and shall have square heads and nuts. Washers shall be malleable castings, unless otherwise shown on the plans.

Open top culverts shall be installed on a skew across the road to provide a culvert grade of at least minus 4 percent, toward the outside shoulder. Culvert grades shall be such that the top of the culvert will be one inch to two inches below the adjacent road surface.

Open top culverts shall be firmly bedded on an earth foundation of uniform density. Large rocks encountered in the bedding shall be removed to a depth of at least six inches below the bottom of the culvert. Bedding and backfill material shall pass a 2-inch square opening and shall be firmly tamped by hand to provide adequate support for the culvert.

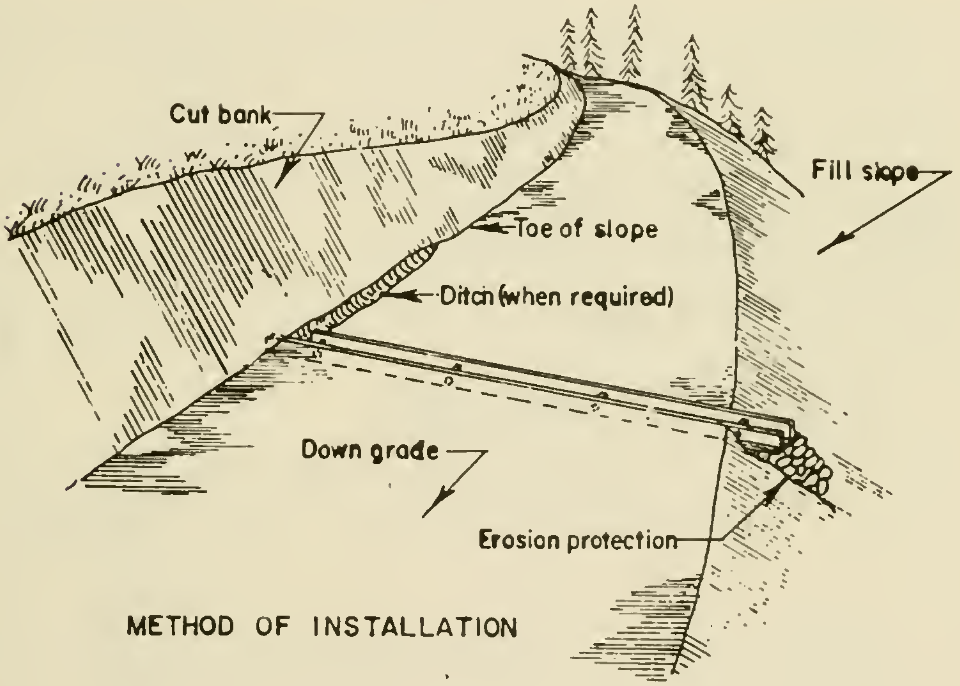
An outlet ditch shall be constructed where staked by the forester and approximately two cubic feet of rock having about six inches least dimension shall be hand placed below each open top culvert outlet. Inlet ditches shall be constructed where staked by the forester.

# CONSTRUCTION DETAIL



$\frac{3}{4}$" Galvonized Pipe Spreader-
3"
4"
3"
Surface of road
$\frac{1}{2}$"X12" Machine Bolts.
$\frac{1}{2}$" Malleable -Washers.
2
8
3
Nail With Size 30-D Nails, spaced 24" c-c
12"

END VIEW

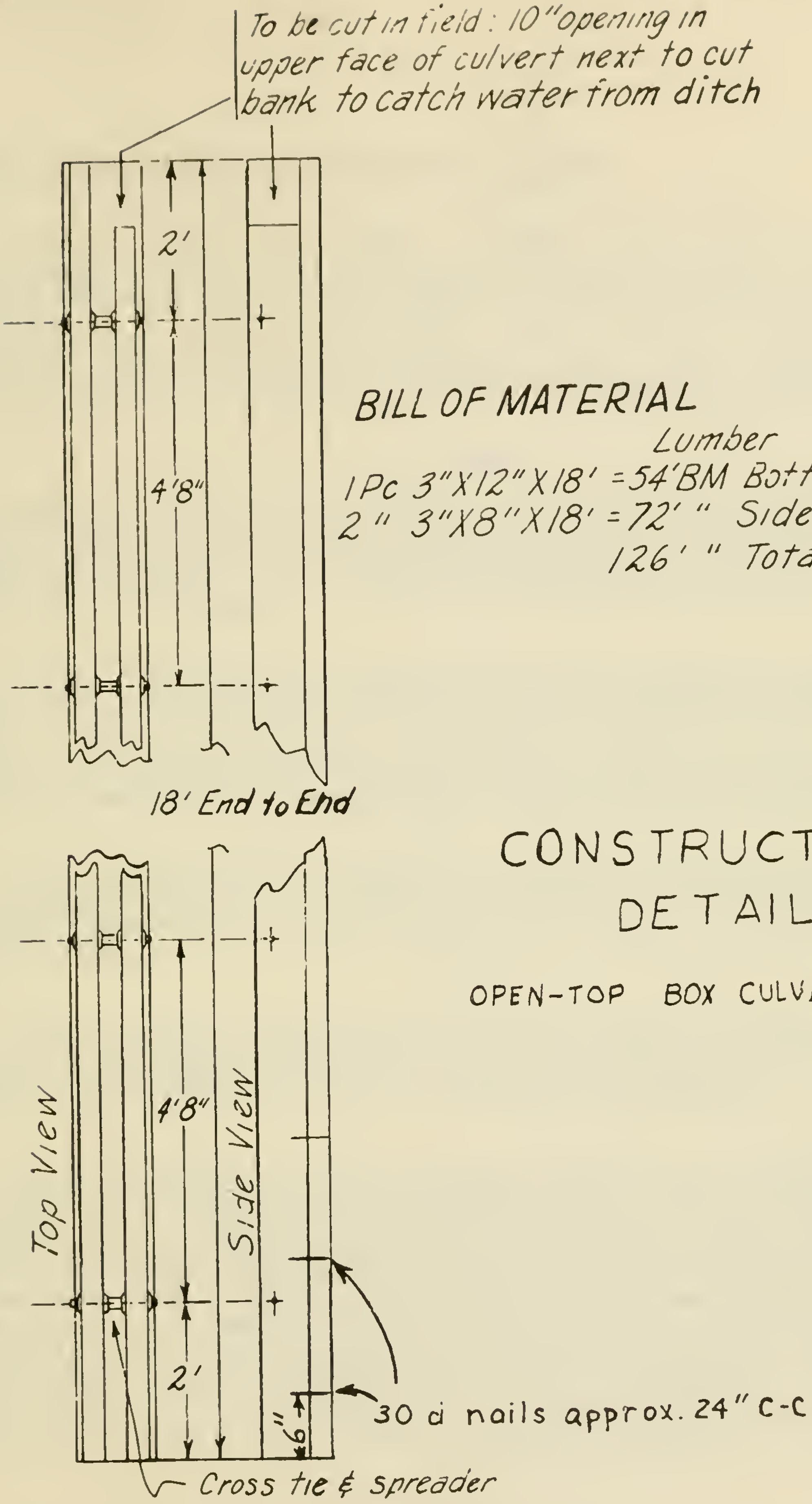


METHOD OF INSTALLATION

OPEN-TOP BOX CULVERT

*FIGURE 1*

Adopted Office of Montana State Forester
June 1968


To be cut in field: 10" opening in upper face of culvert next to cut bank to catch water from ditch
2'
4'8"
18' End to End
4'8"
2'
6"
Top View
Side View
30 d nails approx. 24" C-C
Cross tie & spreader

BILL OF MATERIAL

| | | Lumber | |
|---|---|---|---|
| 1 Pc | 3"X12"X18' | =54' BM | Bottom Plank |
| 2 " | 3"X8"X18' | =72' " | Side " |
| | | 126' " | Total |

## CONSTRUCTION DETAIL

### OPEN-TOP BOX CULVERT

FIGURE 2

Adapted [illegible]
June 1968

# ROAD MAINTENANCE SPECIFICATIONS (GRADING OF ROADWAY) (Sheet 8)

Grading of Roadway shall consist of grading existing roads and restoring the continuity of the roadway grade and width to approximately its original constructed condition. It shall include the removal from the roadway, including ditches, of all debris, logs, limbs, slough material, and exposed rocks; the repair and shaping or construction of drainage ditches, drainage dips, and soil berms, the restoration of shoulder widths consistent with adjacent uneroded portions of roadway; and the grading of parking areas and turnouts.

## Methods

Equipment. Blading and other grader work shall be performed using a motor grader weighing at least 20,000 pounds, and with an engine rated at least 100 horsepower. The grader shall be equipped with cab, scarifier arm with teeth, and a blade assembly with dimensions of at least 12 feet by 2 feet by 3/4 inches.

Larger rocks or portions thereof which protrude from the road surface, or which cause an obstruction to ditch flow, shall be removed by scarifying and blading, by hand picking, or by blasting. If rock must be blasted, it shall be broken to a depth of at least six inches below the road surface. Other rock that will not pass a four inch square opening shall be removed from the road surface by hand picking, blading, or by using rock rakes.

Suitable material, as determined by the forester, removed from roadside ditches, shall be spread and used on the road surface. All unsuitable material removed from roadside ditches shall be bladed across the roadway and side cast.

Where depressions, ponds, ruts, or erosion gullies occur on the road surface, such surface areas shall be scarified to the depth of the depressions, then smoothed by blading to eliminate the depressions.

In blading operations, where roadside ditches are to be maintained, at least three passes with the motor grader shall be made. The first pass shall be for pulling material from the roadside ditch, the second and third passes for blading and final shaping of the road. Where no roadside ditches exist at least two passes shall be made with the motor grader, covering the width of the road, and cutting, filling, and otherwise smoothing the road surface. When the required number of passes is found to be inadequate to properly accomplish the work under this item, the contractor shall perform additional grading, as directed by the forester. In surface blading operations, all existing crowns, inslopes, outslopes and drainage dips shall be retained, except where otherwise designated by the forester.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

When dry weather conditions persist to the extent that the ground surface is too dry for satisfactory grading, the contractor may, in lieu of discontinuing work, water the road surface at his expense, and proceed with the grading work.

Drainage dips shall be constructed at locations shown on the plans and as staked by the forester in accordance with Figure No. 3 of the drawings.

An outlet ditch of approximately 50 feet in length, as staked by the forester, shall be made for each drainage dip to be constructed under this contract. Such ditches shall have a uniform and continuous downgrade, and shall be placed in such a manner that discharged water will not flow back toward the roadway. Existing outlet ditches shall be repaired and cleaned where shown on the plans, or where staked by the forester.

## ROAD MAINTENANCE (SELECTIVE REMOVAL OF TREES AND SNAGS)

This item shall consist of removing and disposing of such isolated trees and snags standing along the roadway as are designated by the forester for removal under this item. Item shall include the removal of trees that are leaning and are otherwise dangerous, and such snags which, in the opinion of the forester, are a hazard to traffic.

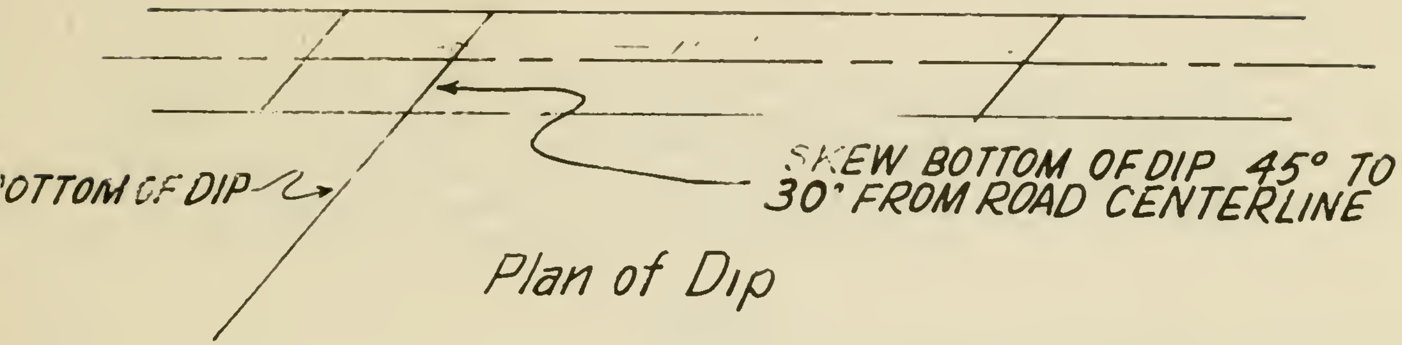
### Methods

Trees standing in the roadway shall be cut one foot below road surface. Designated trees outside of but adjacent to the roadway shall be cut so that the stump is at least 12 inches below road grade.

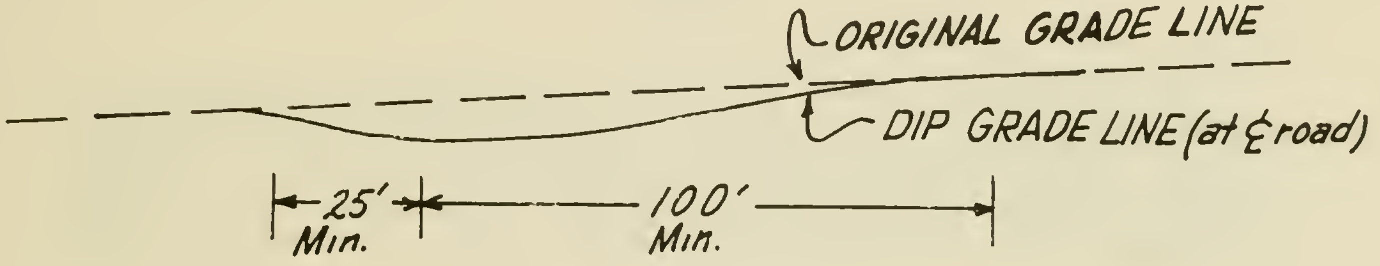
Disposal. All snags and trees cut under this item shall be limbed. The limbs shall be scattered at locations as approved by the engineer. The trunks shall be left where they fall, provided they lie flat on the ground 15 feet or more beyond the road shoulder. Where trunks fall within 15 feet of the shoulder, such trunks shall be moved beyond the 15-foot limit. Where trunks are hanging a foot or more off the ground, and in the opinion of the forester increase the fire hazard, such trunks shall be cut into sections and left lying flat on the ground.

# ROAD MAINTENANCE CONSTRUCTION DETAILS

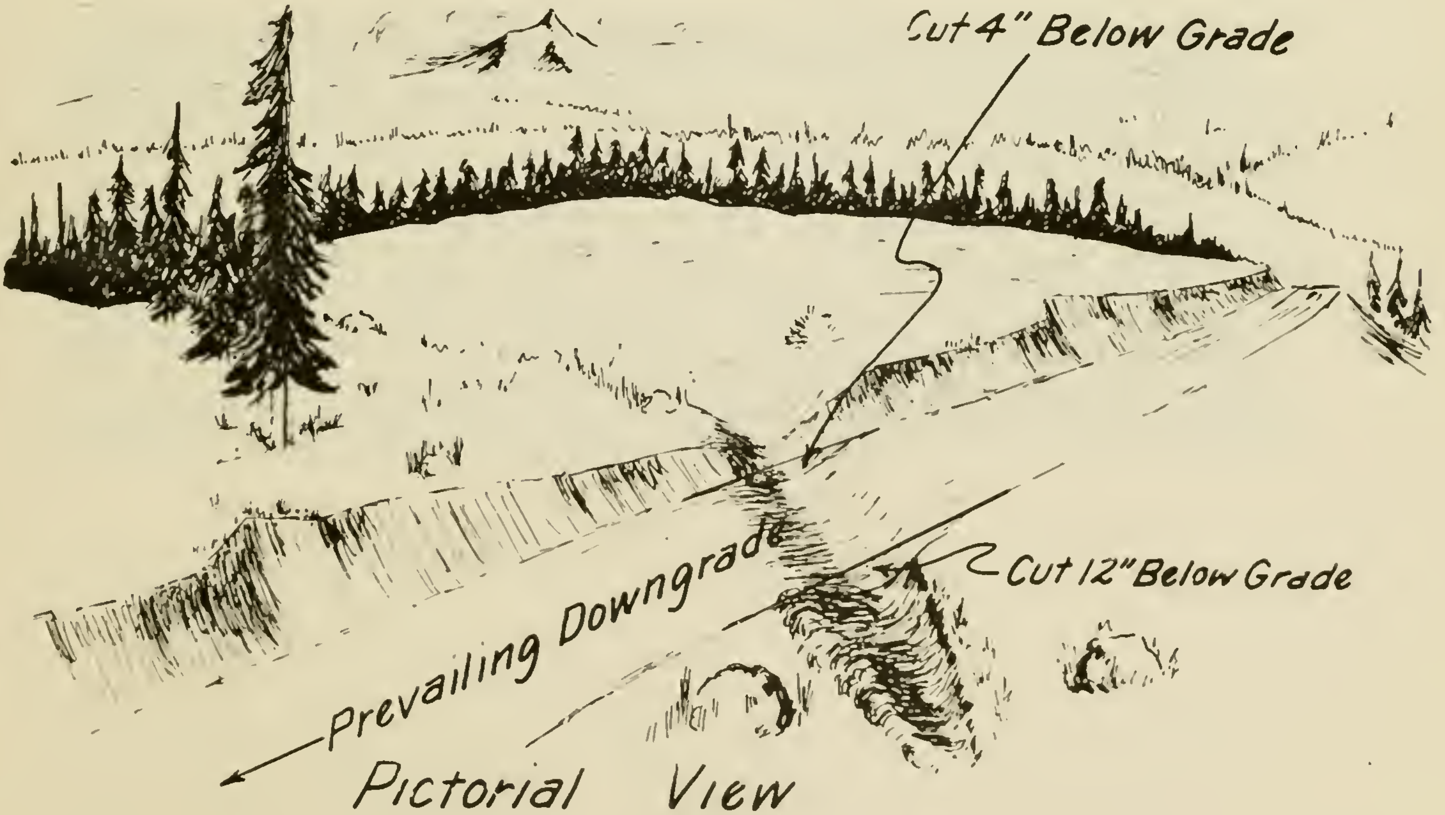
## DRAINAGE DIPS



Plan of Dip



Profile of Dip



Pictorial View

FIGURE 3

## UNCLASSIFIED EXCAVATION FOR SLIDE REMOVAL AND EMBANKMENT REPAIR

This item shall consist of excavating and disposing of slide material and excavating and placing embankment material for the repair of slumped sections of the roadway. It shall include the removal of all slide material logs, and debris from the existing road surface, ditches, and backslopes; and reconstruction of embankment of slumped or eroded portions of roadway, all in accordance with these specifications and plans.

### Methods

Disposal of Slide Material. All material removed from slides shall be hauled to disposal areas as shown on the plans or as directed by the forester. No material shall be sidecast except where ordered by the forester. Upon completion, all disposal areas shall be dressed and left in a neat condition satisfactory to the forester. All logs, limbs, and other vegetative debris shall be separated from other slide material and burned in areas designated by the forester.

Reconstruction and Repair of Embankments. Slumped road sections to be repaired by placing of embankment shall be benched as directed to receive the embankment. All logs and debris shall be removed and disposed of as prescribed in paragraph above. Embankment material shall be placed in layers not to exceed 12 inches in depth. It may be placed by end dumping and spreading or by other approved methods. Each slumped section of roadway shall be built up to the elevation of the original road surface as determined from adjacent sections of undamaged roadway. At least 25 percent of material used for embankment shall be rock pieces no larger than 8 inches least dimension except that all material placed lower than 6 feet above the high water mark of adjacent live streams shall be large, clean rock suitable for slope protection. The contractor shall exercise care in placing fill material to prevent it from spilling into live streams. Unsuitable material excavated from slides shall not be placed in road embankments.

# SIGNS

Adequate and effective signs are invaluable to the public and to the Office of State Forester personnel in the use and administration of State forest lands. Sign needs for fire control will normally have priority over other programs.

## Responsibility:

It is the function of the line to get adequate and effective sign preparation, erection and maintenance, subject to established procedures.

It is the function of federal, State and county authorities to erect signs for the safety and guidance of travelers along U.S., State and county roads. As a general rule the State Forester will erect only the following types of signs along roads:

1. District boundary signs
2. Fire warning signs
3. Information signs calling attention to and directing to State improvements, etc.
4. Signs at roads and trail intersections, directing to points along road or trail which are not adequately signed by local authorities.

The District contemplating the erection of a sign will obtain permission from the landowner. If placement is contemplated on a right-of-way, permission should be obtained from the local State or county agency owning the right-of-way.

## Definitions:

**POSTERS** - For administrative purposes the term "posters" includes all temporary notices, directions or instructions, ordinarily made of paper, cardboard or cloth. They may or may not be illustrated. They include campground rules, timber sale notices, fire rules, trespass notices, as well as the illustrated fire prevention posters, etc.

**SIGNS** - For administrative purposes the term "signs" includes all notices, directions, instructions, constructed of durable material such as wood, plywood or metal. Included are signs showing directions; road and trail names and numbers; names of streams, meadows, campgrounds, administrative stations and other places; historical and forest management information; entrance and boundary signs. All new signs will conform to specifications established herein.

**LARGE SIGNS** - Any sign that is larger than the specifications prescribed for small signs will be considered separately and must have staff approval before construction.

**SMALL SIGNS** - The standard small sign may be either one or two lines. It will be 1 5/8" thick, with routed three inch (3") letters, length is variable. One or two posts may be used.

One (1) line: 5 3/4" wide with sign symbol on left side.
Two (2) line: 9 1/2" wide with sign symbol centered on left side.

Preferred erection of small signs will be on peeled, dried and stained posts with 1/3 of their length below ground level. Posts should have "breakaway" feature where appropriate. Signs will be attached with at least two lag screws or galvanized nail of a sufficient size to hold firmly without splitting the sign. Standard signs will be stained Mission Brown. Routed letters will be painted white.

SIGN SYMBOL - The sign symbol consists of the routed outline of the State of Montana with the routed outline of a tree superimposed. Its use should be governed by considering the effect if the symbol were read: "Office of State Forester". Therefore, it would not be used on "Garbage", "Men," "Women," etc.

ROAD SYSTEM SIGNS - Road System Signs are special signs smaller than "small signs" used to designate roads by a letter/numbering system. These special signs on 3/4" boards will consist of only the "sign symbol" and the letter/numbers assigned. Letter-numbering systems have not as yet been approved by the staff.

General Instructions:

The following general instructions should be observed in the requesting, manufacturing and posting of signs.

1. Caution should be exercised against excessive number of signs, ill-considered wording and poor placement. Each sign should serve a definite and specific purpose.

2. The value and usefulness of a sign depends upon the information carried. Care must be taken to obtain correct spelling and accurate "distances" (if shown on sign). Abbreviations should be avoided as far as possible, but if used, the correct abbreviation of the word will be used.

3. Always remove old signs when new signs are erected, except when the old signs are in good condition and show information not contained on the new sign.

   Existing signs, if in good condition, need not be replaced because they do not conform to present standards, but they should be replaced with approved signs as soon as they require repair or become illegible.

4. All signs must be kept in good repair. Leaning or broken posts and damaged signs must be regularly repaired and restained or replaced.

5. All appropriate signs will be identified by using the sign symbol.

6. Road directional signs in addition to the pertinent information as to destination, etc., may use, when approved, the identifying road signs attached to some post. Roads that cannot be tied to any particular destination, topographical feature, etc., or spur roads, dead-end roads or intermediate points along a given road may use only the identifying letter, road number, and State outline (sign symbol) on the sign.

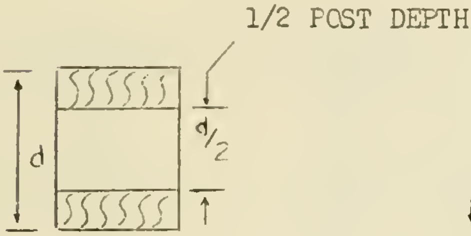
7. Requests for signs should be submitted in writing through normal channels and will, as a minimum, list: requester, quantity, accurate and complete spelling, proper wording, distances and direction of arrows, desired delivery procedure and date and proper approval.

8. Requisitions for signs will be approved as policy established in this manual or as directed by the Deputy State Forester (Opns.)

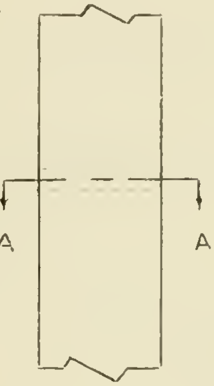
Break-away feature:

All signs installed along highways or other appropriate locations must be at least 20 feet from the edge of the roadway (blacktop or concrete) and have the following break-away feature:

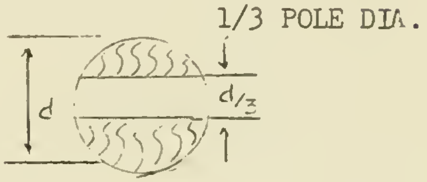
A one inch slot across neutral axis six (6") inches from the ground line formed by successive drilling with 1" bit (Posts 4" x 6" or larger.) Dress with chisel and seal with preservative. The slot width will be as detailed below:



POST SECTION A-A



SLOT DETAIL



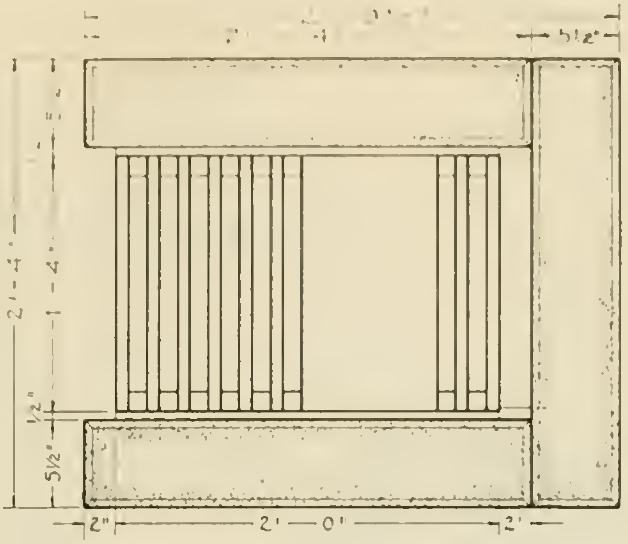
POLE SECTION A-A

MAINTENANCE OF SIGNS SPECIFICATIONS

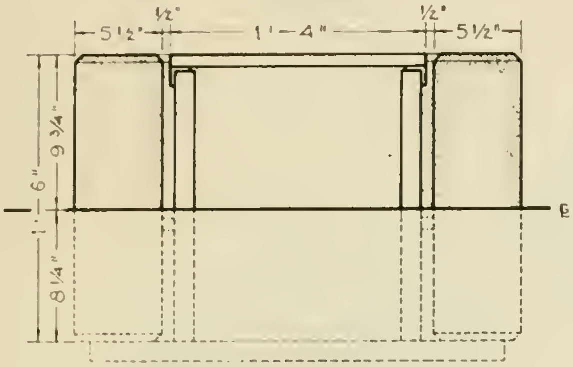
Sign Maintenance shall consist of replacing signboards and posts and installing new posts and signboards at the locations which are listed and identified on the drawings by geographical names or mile locations and located as staked on the ground. This item also shall include straightening, renailing, and resetting existing signboards and posts.

Nails and spikes shall be galvanized and of a size sufficient to hold firmly without splitting the signboards. Posts shall be peeled cedar, Douglas-fir, western larch, lodgepole pine, or Englemann spruce native material with a minimum top diameter of 6 inches.

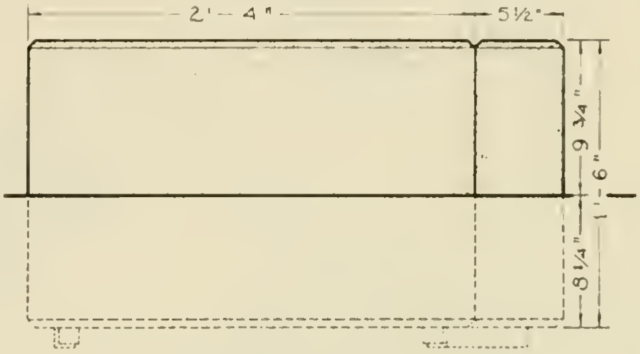
All loose signboards shall be straightened and renailed. All signposts which are loose or out of plumb shall be straightened and firmly reset. New posts shall be set with a minimum of two feet in the ground and with the tops approximately five feet above the ground. Posts should have "break-away" features where appropriate. Signs shall be erected at the staked locations or as approved.



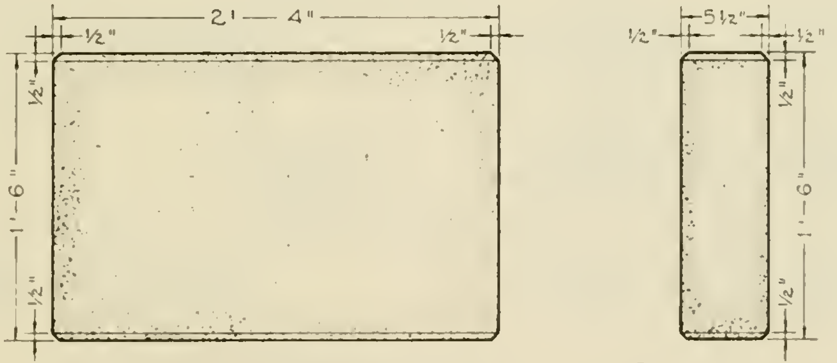
PLAN



FRONT ELEVATION



SIDE ELEVATION



SIDE ELEVATION END ELEVATION

CONCRETE BLOCK DETAIL

Maximum of ¾" aggregate shall be used in the concrete blocks. Fireplace will be constructed and installed in such a way that the top will be level across the grate, plate and blocks.

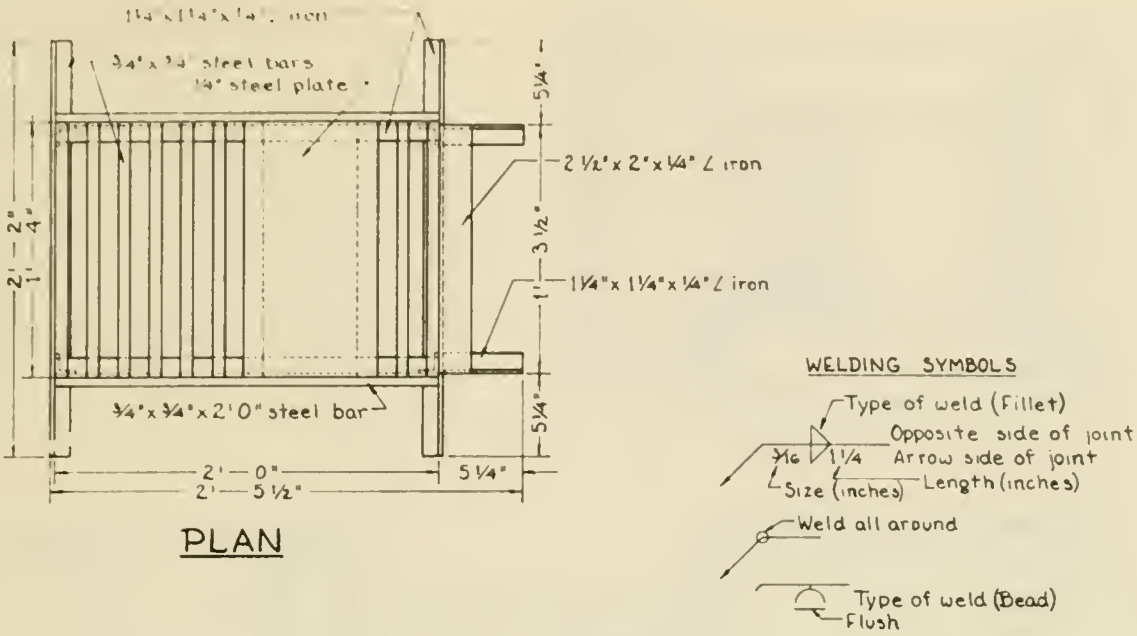
Design RW Recreation and Lands Date 6-1-67
Drawn RW Date 6-5-67
Reviewed TB Date 6-13-67
APPROVED E F Barry Recreation and Lands Date 6-19-67
APPROVED Glenn L. Hacker Engineering Date 6-16-67
APPROVED Date

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

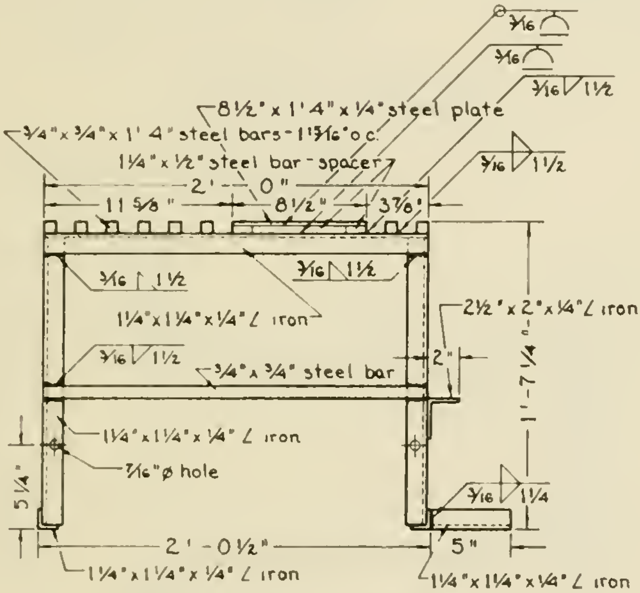
REGION ONE

FIREPLACE
3 Block Concrete

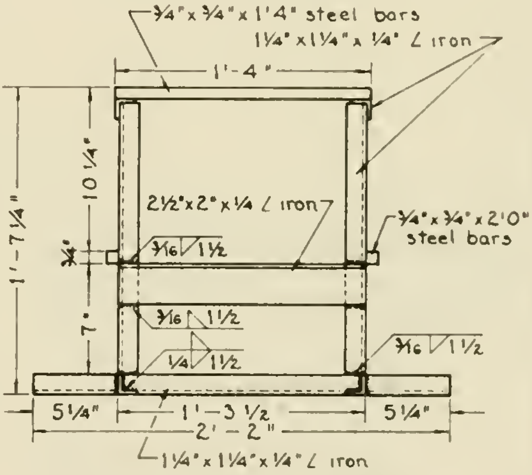
Plate 14 A-1 R1
FSH 2316.14 Sheet 1 of 3



PLAN



SIDE ELEVATION



REAR ELEVATION

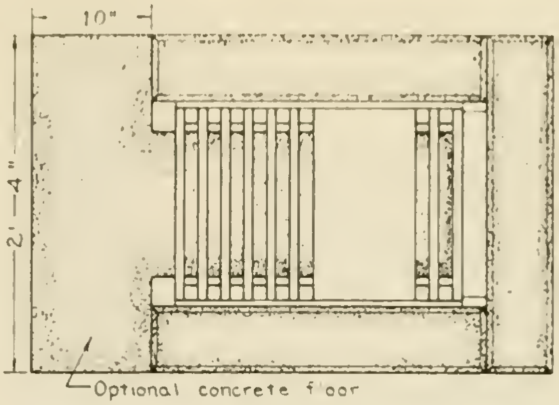
| | | | |
|---|---|---|---|
| Design | Rw and others<br>Recreation and Lands | Date | 6-1-67 |
| Drawn | Rw | Date | 6-5-67 |
| Reviewed | FB | Date | 6-13-67 |
| APPROVED | E F Barry<br>Recreation and Lands | Date | 6-19-67 |
| APPROVED | Glenn L. Tucker<br>Engineering | Date | 6-16-67 |
| APPROVED | | Date | |

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

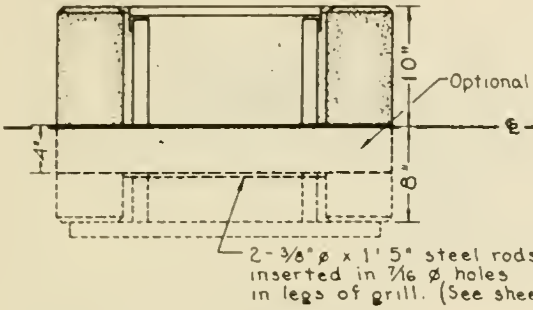
REGION ONE

## FIREPLACE
3 Block Concrete

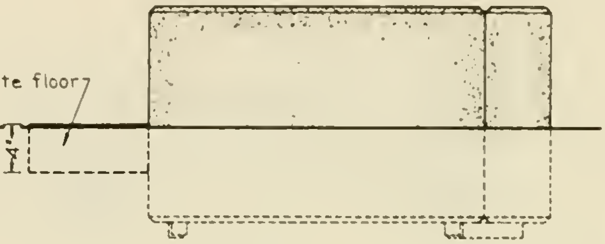
Plate 14 A-1 R1
FSH 2316.14 Sheet 2 of 3



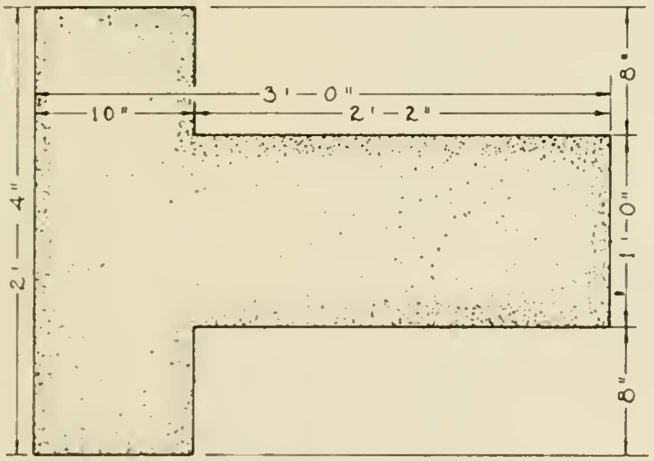
PLAN

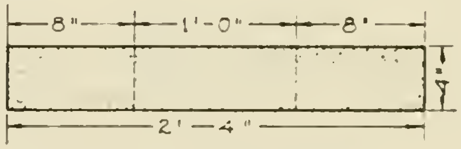

10"
Optional concrete floor
℄
4"
8"
2-3/8" ø x 1' 5" steel rods inserted in 7/16 ø holes in legs of grill. (See sheet 2.)

FRONT ELEVATION



SIDE ELEVATION





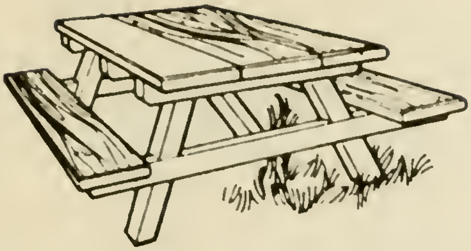
FRONT ELEVATION

Maximum of 3/4" aggregate will be used in the concrete fireplace floor.

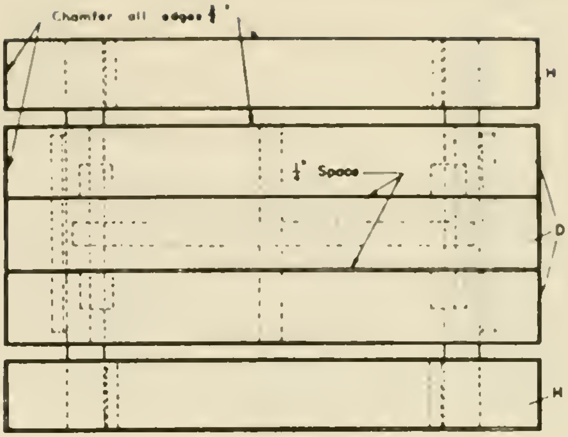
PLAN

OPTIONAL CONCRETE FLOOR

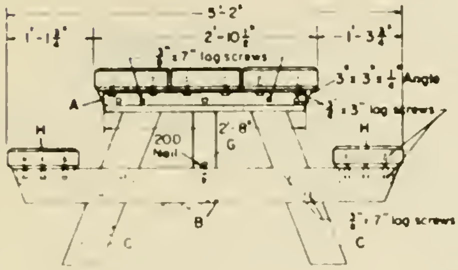
|  |  |  |
|---|---|---|
| Design — Recreation and Lands Date 6-1-67<br>Drawn — Date 6-5-67<br>Reviewed — Date 6-13-67 | U. S. DEPARTMENT OF AGRICULTURE<br>FOREST SERVICE | **FIREPLACE**<br>3 Block Concrete |
| APPROVED E F Barry — Recreation and Lands Date 6-19-67<br>APPROVED Glenn L. Hacker — Engineering Date 6-16-67<br>APPROVED — Date | **REGION ONE** | **Plate** 14 A-1 **R1**<br>FSH 2316.14 Sheet 3 of 3 |



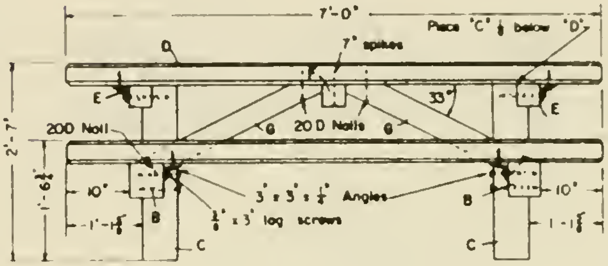
FACSIMILE



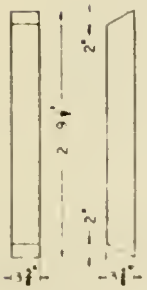
PLAN



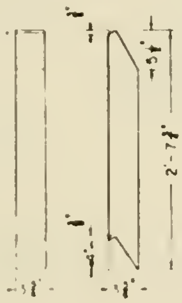
END ELEVATION



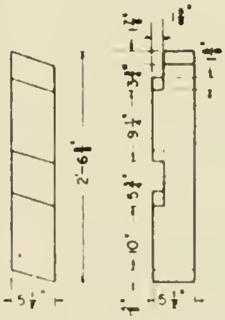
SIDE ELEVATION



A, E, P, F

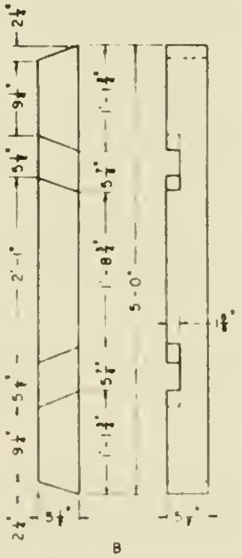


G



C

Construct [illegible] as shown B
2 opposite hand



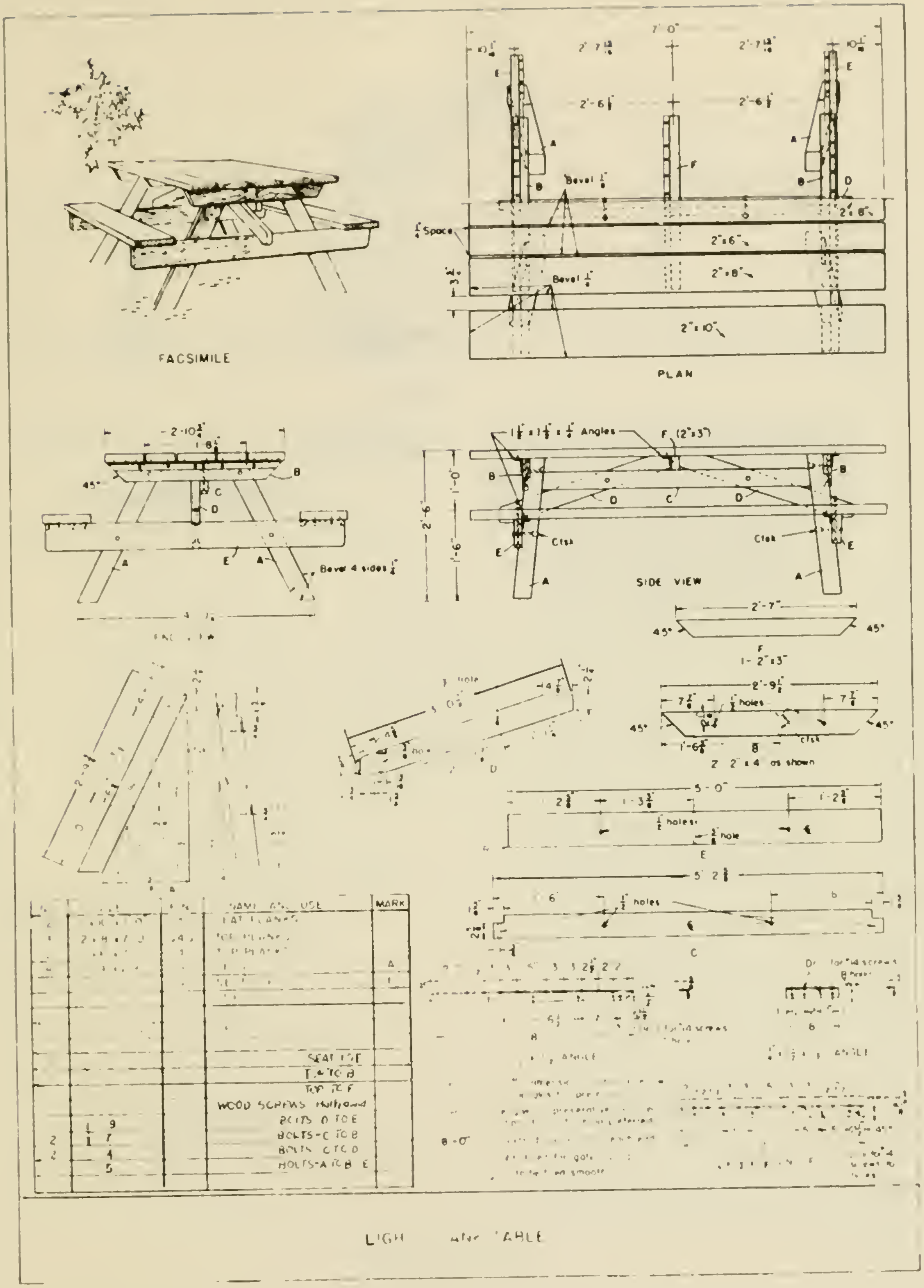
B

MATERIAL LIST

| NO | SIZE | FINISH | NAME | MARK |
|---|---|---|---|---|
| [illegible] | 4"×12"×[illegible] | S4S | [illegible] | [illegible] B H |
| [illegible] | 4"×6"×5' | S4S | SEAT [illegible] | [illegible] |
| 4 | 6"×[illegible] | S4S | LEG | [illegible] |
| 2 | 4"×[illegible]×5' | S4S | [illegible] | |
| [illegible] | 4"×3"×5' | S4S | TABLE [illegible] | A E F |
| [illegible] | [illegible] | GALV | 3/4" G [illegible] | |
| 4 | 6" | GALV | [illegible] | |
| 2 | [illegible] 2 H | GALV | [illegible] | |
| 4 | 3"×3"×1/4" [illegible] | [illegible] | [illegible] | |
| 24 | 3/8"×[illegible] | GALV | [illegible] | |
| 12 | 3/8"×[illegible] | [illegible] | [illegible] SCREWS | |

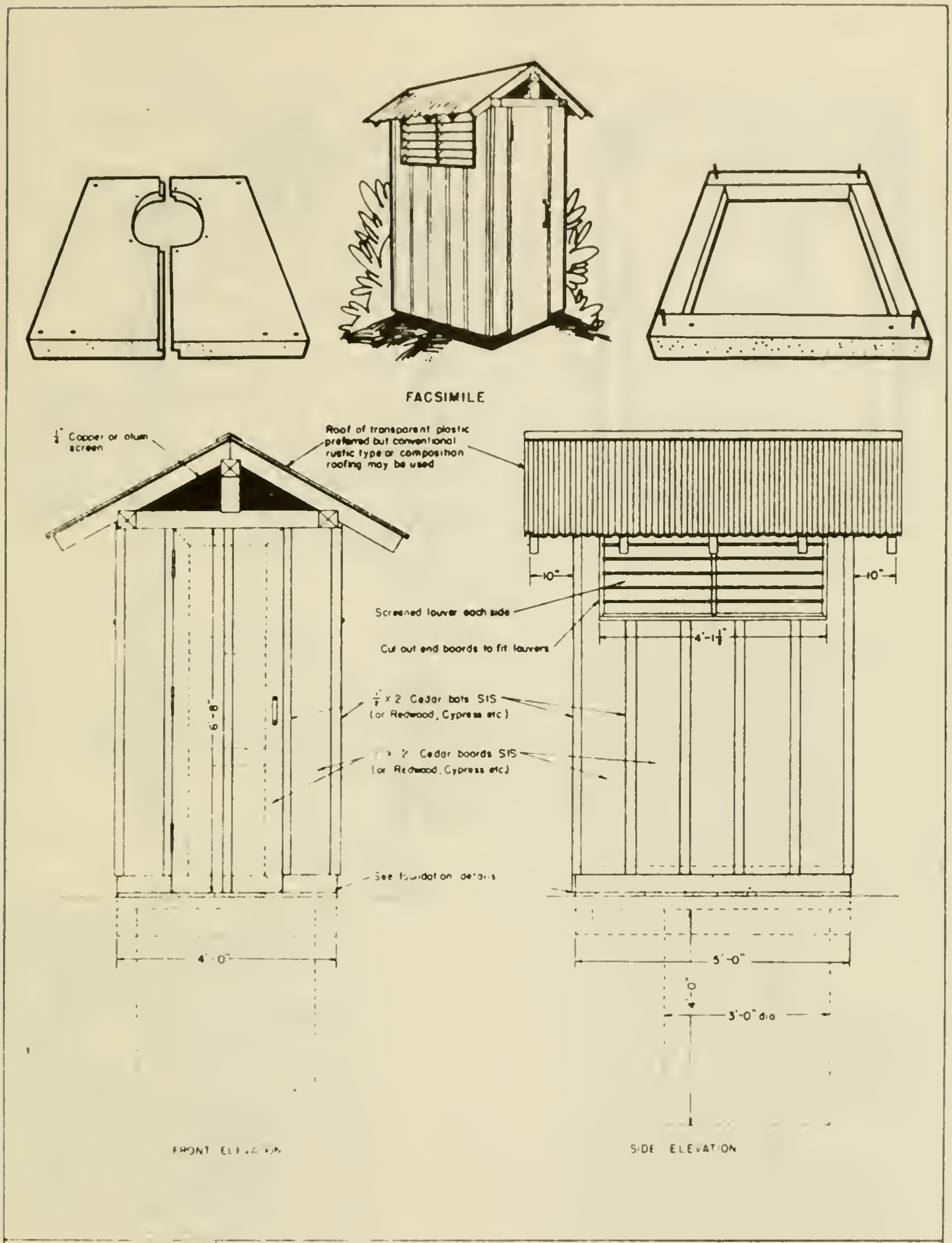
Note
Lumber to be dry cedar or redwood
Bore holes for spikes 1/16" under size
For 8' table extend planks 6" at each end

HEAVY PLANK TABLE


FACSIMILE
PLAN
7'-0"
2'-7 13/16"
2'-7 13/16"
10 1/16"
10 1/16"
2'-6 1/4"
2'-6 1/4"
E
A
B
F
D
Bevel 1/8"
1/4" Space
2"x8"
2"x6"
2"x8"
2"x10"
3 1/2"
2'-10 3/4"
1'-8 1/4"
45°
B
C
D
E
A
Bevel 4 sides 1/8"
1 1/2" x 1 1/2" x 1/8" Angles
F (2"x3")
B
O
D
C
D
E
Ctsk
Ctsk
A
SIDE VIEW
2'-6"
1'-0"
1'-6"
2'-7"
45°
45°
F
1- 2"x3"
2'-9 1/2"
7 5/8"
7 5/8"
1/2" holes
45°
45°
1'-6 5/8"
B
Ctsk
2 - 2"x4 as shown
D
5'-0"
2 3/4"
1'-3 3/4"
1'-2 3/4"
1/2" holes
3/8" hole
E
5'-2 3/4"
6"
1/2" holes
C
MARK
NAME AND USE
SEAT TO E
T... TO B
TOP TO F
WOOD SCREWS flathead
BOLTS D TO E
BOLTS-C TO B
BOLTS C TO D
BOLTS-A TO B E
A
2
2
1/4
1
9
7
4
5
6-0"
smooth

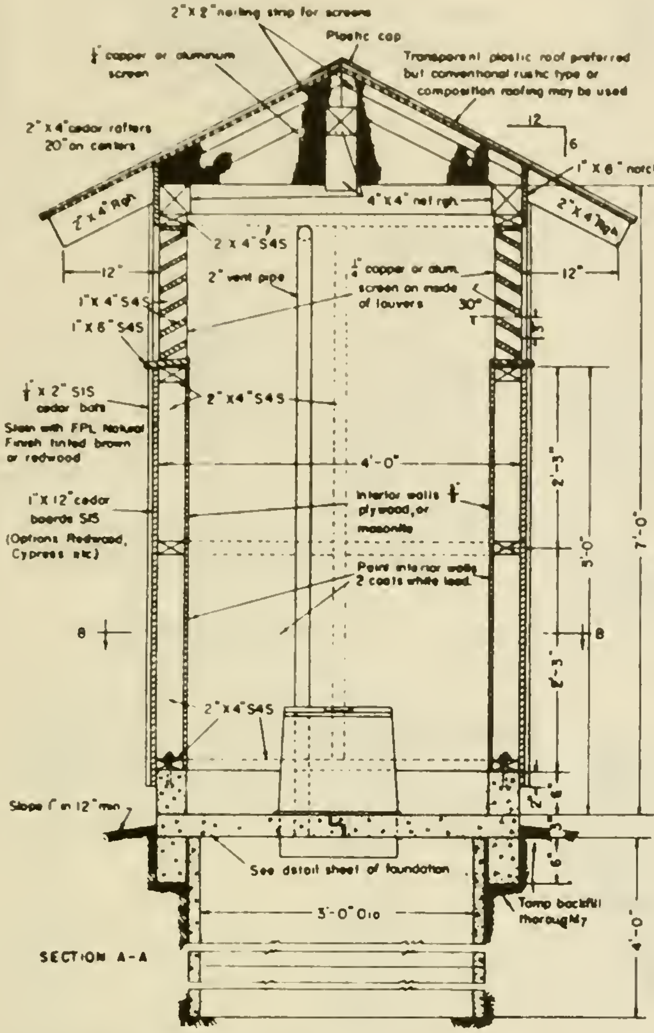
LIGH[illegible] TABLE

[illegible]

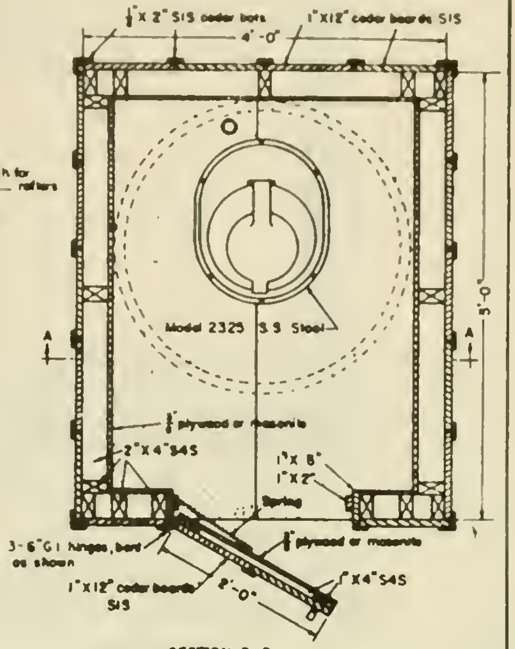

FACSIMILE
¼" Copper or alum screen
Roof of transparent plastic preferred but conventional rustic type or composition roofing may be used
10"
10"
Screened louver each side
Cut out end boards to fit louvers
4'-1½"
½ x 2 Cedar bats S1S (or Redwood, Cypress etc)
1 x 2 Cedar boards S1S (or Redwood, Cypress etc)
6'-8"
See foundation details
4'-0"
5'-0"
4'-0"
3'-0" dia
FRONT ELEVATION
SIDE ELEVATION

SHEET 1

SINGLE PIT TOILET


2"X2" nailing strip for screens
Plastic cap
¼" copper or aluminum screen
Transparent plastic roof preferred but conventional rustic type or composition roofing may be used
2"X4" cedar rafters 20" on centers
12
6
1"X6" notch for rafters
2"X4" Rgh
4"X4" rel rgh
2"X4" Rgh
2 X 4" S4S
12"
2" vent pipe
¼" copper or alum. screen on inside of louvers
30°
12"
1"X4" S4S
1"X6" S4S
½"X2" S1S cedar bats
Stain with FPL Natural Finish tinted brown or redwood
2"X4" S4S
4'-0"
1"X12" cedar boards S1S
(Options Redwood, Cypress etc)
Interior walls ¼" plywood, or masonite
Paint interior walls 2 coats white lead
2'-3"
5'-0"
7'-0"
B
B
2'-3"
2"X4" S4S
Slope 1" in 12" min
See detail sheet of foundation
3'-0" Dia
Tamp backfill thoroughly
4'-0"

SECTION A-A



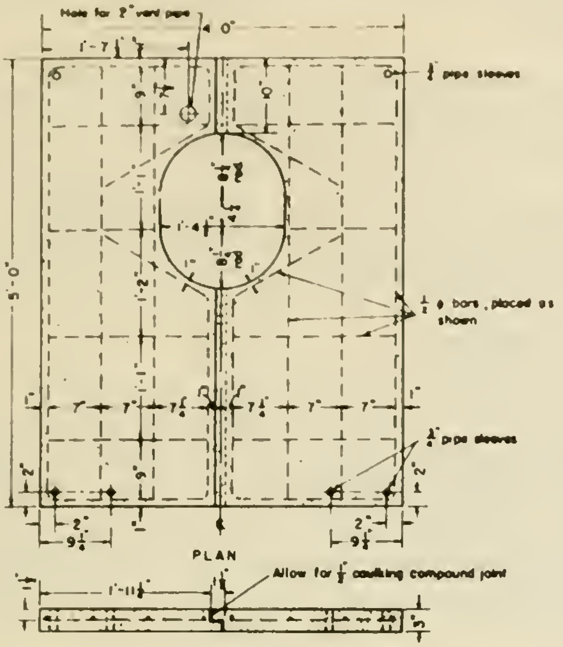
SECTION B-B

| NO | SIZE | FIN | USE |
|---|---|---|---|
| 1 | 6" handle-gate hook | Galv | Screen door set - Door |
| 3 | 6" tee hinge | Galv | Bend as shown - Door |
| 1 | 2" dia vent pipe | Galv Im | 1-7'-0" & 1-0'-9" |
| 6 | 1½" R H screws | Brass | Toilet to slab |
| 6 | ½ x 4" | Galv | Anchor bolts with nuts, washers |
| 6 | ½ x 6" | Galv | Bolts with nuts, 2 washers each |
| 22 | ½ x 3" | Galv | Pipe sleeves |
| 4 | ½ x 6" | Galv | Pipe sleeves |
| 1 | No 2325 toilet | S S | Wickland Mfg Co or equivalent |
| 2 | 2'-0" x 3'-0 dia | Opt | Pit liner |
| 2 | ½ ϕ x 14'-0" | Bend | Reinforcing rod |
| 4 | ½ ϕ x 4'-10" | Str | Reinforcing rod |
| 6 | ½ ϕ x 1'-9" | Str | Reinforcing rod |
| 2 | ½ ϕ x 1' 2" | Str | Reinforcing rod |
| 4 | ½ ϕ x 10'-6" | Bend | Reinforcing rod |
| 3 | ½ ϕ x 6'-6" | Bend | Reinforcing rod |
| 2 | ½ ϕ x 1'-6" | Bend | Reinforcing rod |
| 1 | 2" elbow 90° | Galv | Vent pipe |

| NO | SIZE | FIN | USE |
|---|---|---|---|
| 4 | 2"x4" - 4'-4½" | S4S | Plate |
| 3 | 2"x4" - 4'-0" | S4S | Plate |
| 2 | 2"x4" - 11½" | S4S | Plate |
| 15 | 2"x4" - 5'-10½" | S4S | Studs |
| 3 | 2"x4" - 12'-0 | S4S | Blocking |
| 2 | 2"x4" - 4'-2½" | S4S | Studs |
| 10 | 2"x4" - 3'-8" | Rgh | Rafters |
| 3 | 4"x4" - 6'-9½" | Rgh | Roof frame |
| 2 | 4"x4" - 3'-4" | Rgh | Roof frame |
| 2 | 4"x4" - 8" | Rgh | Roof frame |
| 2 | 1"x5" - 6'-8" | S4S | Door frame |
| 2 | 1"x2" - 6'-8" | S4S | Door stops |
| 2 | 1"x4" - 6'-6" | S4S | Door |
| 2 | 1"x4" - 2'-0" | S4S | Door |
| 2 | 1"x4" - 1'-4½" | S4S | Door |
| 10 | 1"x12" - 6'-10" | S1S | Siding |
| 8 | 1"x12" - 4'-8" | S1S | Siding |
| 2 | 1"x12" - 6'-8" | S1S | Door |
| 13 | ½x2" - 6'-10" | S1S | Battens |
| 8 | ½x2" - 4'-8" | S1S | Battens |
| 1 | ½x2" - 8'-6" | S1S | Battens |
| 2 | 1"x8" - 4'-1½" | S1S | Trim at eaves |
| 2 | 4'-4½" x 4'-6" | SO1S | ¼ Plywood or masonite - walls |
| 1 | 3'-4" x 6'-2" | SO1S | ¼ Plywood or masonite - walls |
| 2 | 7½" x 6'-2" | SO1S | ¼ Plywood or masonite - walls |
| 1 | 2'-0" x 6'-8" | SO1S | ¼ Plywood or masonite - door |
| 2 | 1"x4" - 4'-1½" | S4S | Louver |
| 2 | 1"x6" - 4'-1½" | S4S | Louver |
| 6 | 1"x4" - 1'-5½" | S4S | Louver |
| 24 | 1"x4" - 1'-11½" | S4S | Louver |
| 2 | 6'-10" x 3'-9" | Green | Transparent plastic roofing |
| 1 | 6'-10" | Green | Plastic roof ridge |
| 4 | 2"x2" - 1'-4" | S4S | Nailing strip - screens |
| 2 | 1'-6" x 4'-2" | Screen | Copper or Alum ¼ M - Louvers |
| 2 | 1'-6" x 2'-0" | Screen | Copper or Alum ¼ M - Ends |

SINGLE PIT TOILET

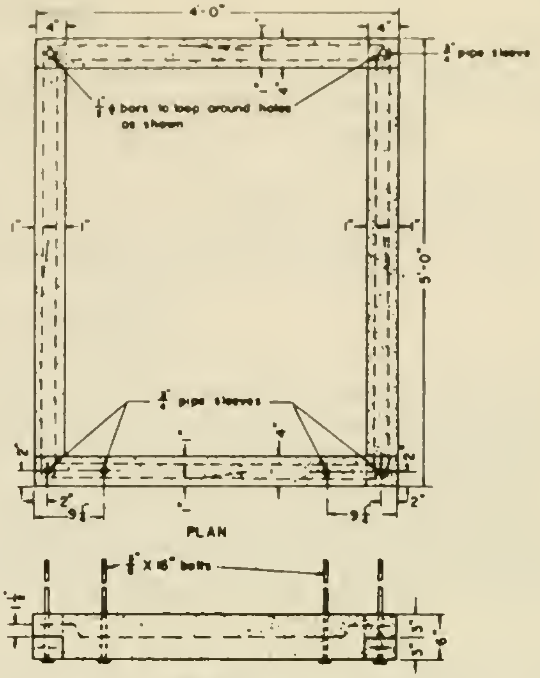
SHEET 2



PLAN

END VIEW

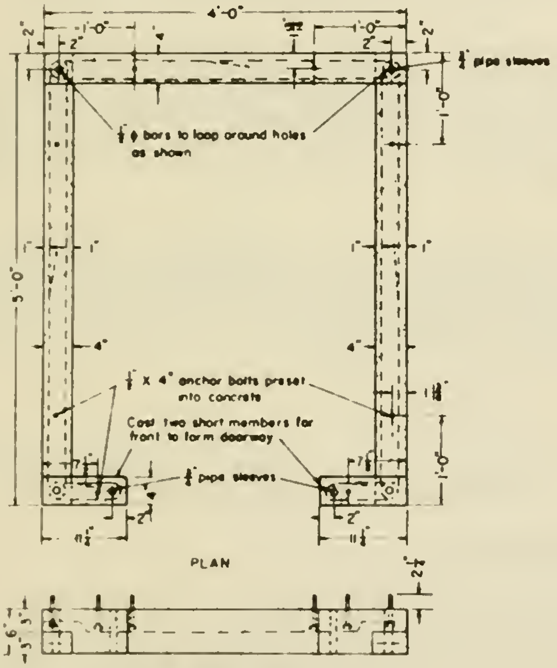
PRECAST CONCRETE FLOOR SLAB



PLAN

END VIEW

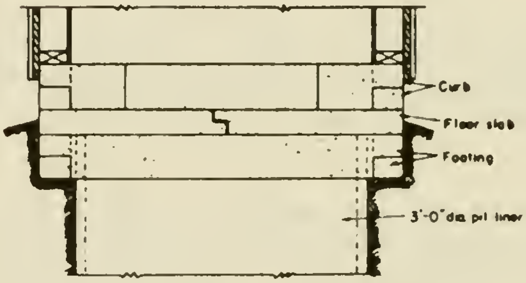
PRECAST CONCRETE FOOTING


4'-0"
1'-0"
2"
3/4" pipe sleeves
1/2" φ bars to loop around holes as shown
1'-0"
5'-0"
1"
4"
1/2" X 4" anchor bolts preset into concrete
Cast two short members for front to form doorway
3/4" pipe sleeves
7"
11 1/4"
6"
3"

PLAN

END VIEW

PRECAST CONCRETE CURB

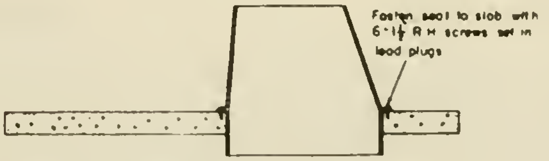


FRONT VIEW

ASSEMBLED FOUNDATION

The curb, floor slab and footings are held together by 6 - 16" bolts inserted through the pipe sleeves

Note, Pit lining options are, conc culvert pipe, conc block, corr metal culvert, brick or treated timbers, 2" min thickness


Fasten seat to slab with 6-1 1/2 R H screws set in lead plugs

MODEL 2325 STAINLESS STEEL TOILET STOOL
WICKLAND MFG CO. OR EQUIV.

SHEET 3

SINGLE PIT TOILET

Adopted Office of [illegible]
June 1962

## TRAIL CLEARING AND GRUBBING SPECIFICATIONS

### Description

This item shall consist of clearing and grubbing in accordance with these specifications and in conformity with the lines and dimensions as shown in specific project construction details or as marked on the ground.

Classification. Clearing classifications as indicated on the plans are only estimates of conditions found on the ground. Construction crews should make their own determinations of clearing classifications.

### Construction Methods

All trees, logs, limbs, and brush shall be removed from the area extending 10 feet above the trail tread and a minimum of 4 feet on each side of the trail centerline. All stumps and exposed roots which are within the trail tread grading prism shall be removed. Stumps left in the lower side of the cleared area shall not be higher than 16 inches above the ground; stumps in the upper side of the area shall not be higher than 6 inches above the ground. Limbs and branches shall be cut flush with tree trunks, and all brush shall be cut at the ground line.

Widening. Additional clearing widths may be required at designated locations to permit passing or for access to water holes or resting places.

Snags and Leaning Trees. Snags and leaning trees which might fall into or across the travelway shall be removed as directed. Unless otherwise provided in the supplemental specifications, selective removal of hazard trees and snags shall be considered a subsidiary obligation for completion of this item.

Disposal of Refuse. All trees and logs shall be limbed, cut into suitable lengths, and removed from the clearing area. Limbs, brush, roots, stumps, and other debris shall be scattered outside of the area to be cleared, unless otherwise provided in the supplemental specifications.

## SPECIAL DITCHES - TRAIL SPECIFICATIONS

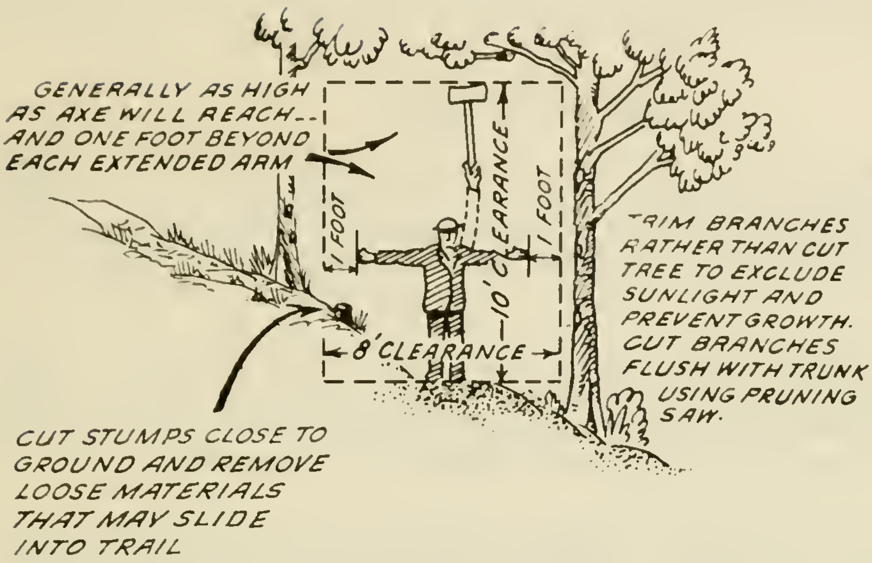
### Description

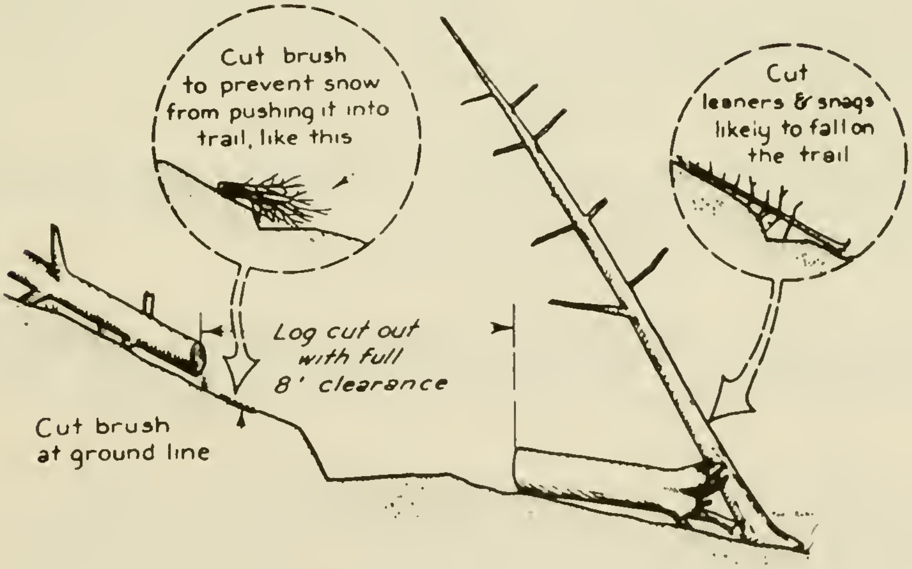
This item shall consist of the construction of special ditches, in accordance with these specifications, where shown on the plans and as directed. The size of special ditches shall be such that the yardage to be moved shall not exceed more than 20 cubic yards per station of 100 feet for any one continuous ditch.

### Construction Methods

Special ditches shall be constructed across boggy areas to provide drainage along the trail tread, and shall be constructed parallel to the trail tread. Ditch excavation material shall be cast aside on the lower side of the trail, and shall not be used to build up the trail tread unless otherwise directed. All ditches shall be excavated and finished true to line and grade and shall be free of roots, sticks, and other foreign material.

## TRAIL CONSTRUCTION DETAILS


GENERALLY AS HIGH AS AXE WILL REACH-- AND ONE FOOT BEYOND EACH EXTENDED ARM
1 FOOT
10' CLEARANCE
1 FOOT
8' CLEARANCE
TRIM BRANCHES RATHER THAN CUT TREE TO EXCLUDE SUNLIGHT AND PREVENT GROWTH. CUT BRANCHES FLUSH WITH TRUNK USING PRUNING SAW.
CUT STUMPS CLOSE TO GROUND AND REMOVE LOOSE MATERIALS THAT MAY SLIDE INTO TRAIL


Cut brush to prevent snow from pushing it into trail, like this
Cut leaners & snags likely to fall on the trail
Log cut out with full 8' clearance
Cut brush at ground line

GOOD CLEARING PRACTICE

FIGURE 1

Adopted Office of Montana State Forester
June 1968

## TRAIL TREAD CONSTRUCTION SPECIFICATIONS

### Description

This item shall consist of excavating and grading the trail tread, including switchbacks, turnpike sections, fords, drainage dips, retaining walls, and safety berms. It shall include all necessary route marking such as blazes, posts, and stone monuments. All work in this item shall be done in accordance with these specifications and in conformity with the lines, grades, and dimensions as shown on the drawings and construction details or as staked on the ground.

### Construction Methods

Grade. All trail tread shall be constructed to the grades as indicated on the drawings and as established on the ground with grade stakes at intervals of not more than 100 feet. Trail grades shall be uniform between the staked points, and it shall be the contractor's responsibility to set intermediate stakes as necessary for uniform grade control.

Width. Normal finished trail tread shall be 24 inches wide unless otherwise provided on the drawings or in these specifications. Cut and fill slopes shall be constructed in accordance with the slope ratios and minimum pack clearance requirements shown in figure 2 of the construction details, unless otherwise specified below.

Tread on Sideslopes Less Than 10 Percent. Where the trail is located on sideslopes of less than 10 percent and the ground material is a dry mixture of earth and rock, no grading is required. However, all loose rock over 2 inches in diameter shall be removed from the surface of the trail tread.

Tread on Sideslopes 10 Percent to 50 Percent. On sideslopes of 10 percent to 50 percent, the tread may be partially on a fill. All duff, limbs, and other debris shall be removed so that fill material is placed on mineral soil. The fill section of tread shall be built slightly higher and at least 6 inches wider than the normal section to allow for settling and sloughing.

Tread on Sideslopes Over 50 Percent. On sideslopes over 50 percent the tread width shall be in a full bench section. Cuts shall be constructed so as to produce stable backslopes with at least the minimum pack clearance as shown in figure 2 of construction details.

Tread Through Cliffs, Ledge Rock, Talus, or Rock Slides. Trail tread across very steep sideslopes or around cliffs shall be a minimum of 24 inches wide, and in addition a rock safety berm 12 inches wide shall be constructed outside the tread.

On ledge rock, talus, or rock slides, the trail tread may be constructed on fill material, provided that the outer edge of the fill is supported by large rocks which are firmly keyed to solid ground. Holes or cracks under the tread shall be filled with small rocks or soil to provide a solid base as shown in figure 3 of construction details.

Trail tread in rocky materials shall be cushioned with selected borrow material as directed.

Turnpike Sections. Turnpike sections shall be constructed across meadows or flats where the ground is wet or boggy during the trail use season.

Ditches from 6 to 12 inches deep shall be constructed parallel to the trail centerline as shown in figure 4 of construction standards. Ditch excavation material shall be used to build up the tread between retaining poles which are firmly staked in place along the outside edges of the trail tread. The retaining poles shall have a minimum of 6 inches top diameter.

Trail tread on turnpike sections may require surfacing or cushioning with selected borrow material.

Stream Fords. In stream crossings where no bridge, culvert, or other drainage structure is required, the trail tread shall be constructed to a minimum width of 3 feet. The tread section of the stream channel shall be smoothed and leveled by removing large rocks and placing a level course of gravel to be retained by a log or rock barrier as shown in figure 5 of construction details.

At all stream fords, as indicated on the drawings, a foot traffic crossing shall be provided by placing one or more logs with safe clearance above high water. Single logs shall be hewed on the top surface, and two or more logs shall be securely fastened together with No. 9 galvanized wire so as to provide a solid tread at least 12 inches wide. A firm, log handrail shall be placed about 4 feet above and 18 inches to the side of the log crossing structure.

Switchbacks. Switchbacks shall be constructed at the locations staked on the ground and in conformity with the requirements shown in figure 6 of construction details. Protective barriers shall be constructed with the materials reasonably available and approved.

Drainage. Proper drainage of surface water from above the trail tread and from the tread surface is an important factor in trail construction. Drainage dips shall be constructed at the locations staked on the ground and in conformity with the requirements shown in figure 7 of construction details. Trail tread shall be outsloped at the ratio of 1 inch per foot of tread width in selected areas.

Route Marking. The entire trail route shall be delineated by marks intervisible in both directions. All such marking shall be done by blazing live trees or by placing posts or stone monuments in conformity with the requirements shown in figure 11 of construction details.

a. Blazing of live trees shall be used whenever possible. All blazes shall be U. S. Forest Service standard which consists of two rectangular notches or cuts 4 inches wide, one above the other with a 2 to 4 inch space between notches. The upper notch shall be 2 inches high and the lower notch 8 inches high. They shall be cut so that the outer and inner bark is removed to expose the sapwood. Blazes shall be placed about 6 feet above the trail tread and on two sides of the same tree so as to be visible from both directions along the trail.

b. Rock mounds shall be made from stones suitable to form a stable mound 18 inches high.

c. Posts of 3 to 6 inches top diameter shall be placed 2 feet in the ground and shall extend 3 feet above the ground. Posts shall be dry, sound material, butt treated by cold-soaking for 48 hours in a fuel oil solution containing 5 percent pentachlorophenol. Post butt treatment shall extend at least 6 inches above the ground line.

d. Blazes may be painted on large boulders or rock ledges where no trees are available, and old blazes shall be freshened by using International Orange outside paint.

Machine Construction. Gasoline-powered tools and equipment such as rock drills, chain saws, and trail graders may be used in any phase of trail construction. However, no construction with bulldozers shall be permitted unless so provided in the Special Conditions or Supplemental Specifications.

## SELECTED BORROW - TRAILS - SPECIFICATIONS

### Description

This item shall consist of selected borrow material, obtained from sources outside of the tread construction prism, to be used as trail tread cushioning or surfacing in accordance with these specifications and at the locations shown on the drawings or staked on the ground.

### Materials

Borrow material shall be fine gravel or granular mineral soil with sufficient binder or filler to hold the material in place. Borrow areas, other than those shown on the drawings, may be selected by the contractor and may be used if approved in writing.

### Construction Methods

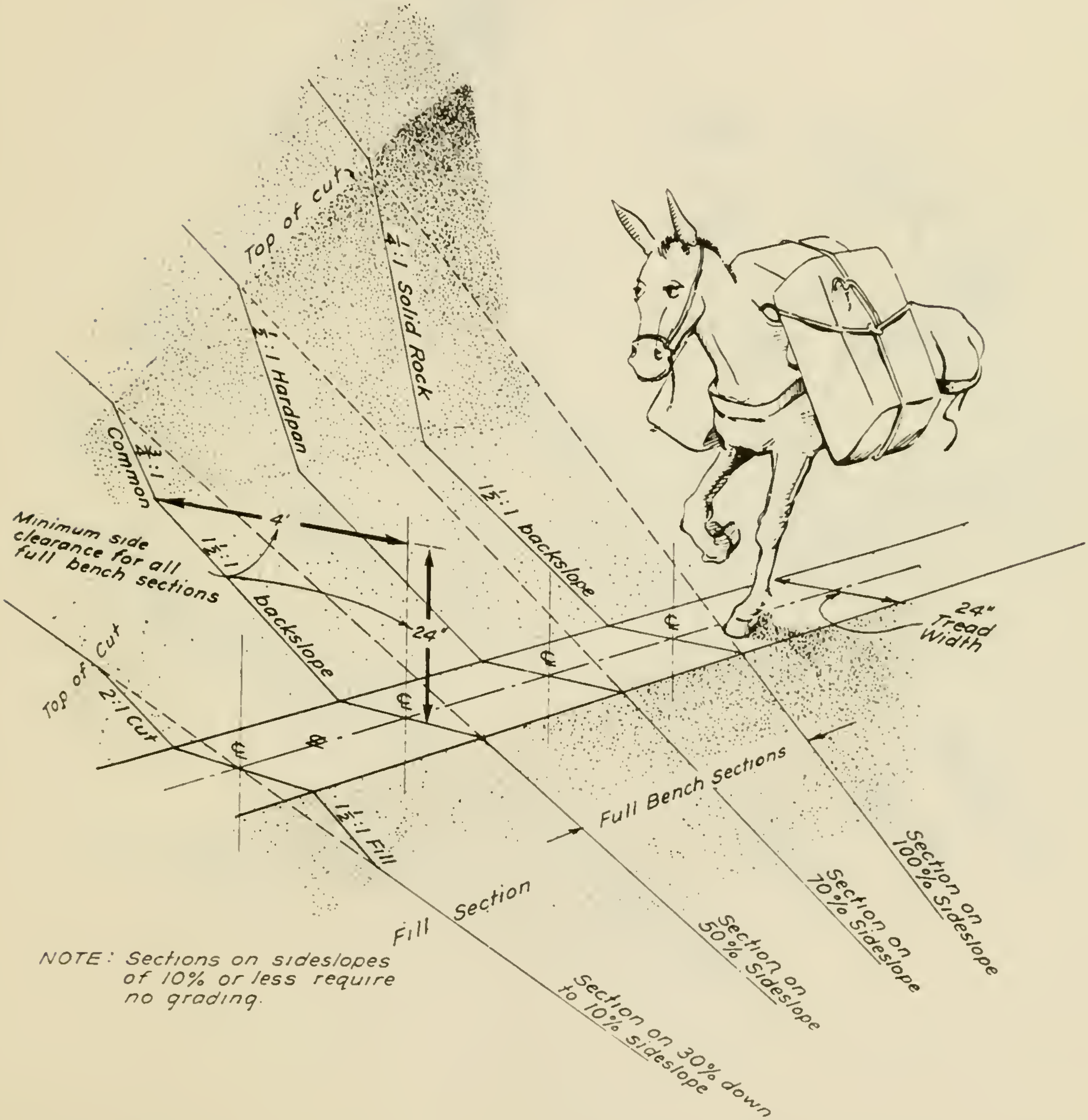
Selected borrow material shall be placed on those sections of trail as staked on the ground or as directed. Such material shall be applied in sufficient quantity to form a course of suitable material of 3 inches loose depth over the required trail tread width.

When the required material has been removed, borrow areas shall be shaped to a reasonably smooth condition that will encourage growth of native vegetation.

# TRAIL CONSTRUCTION DETAILS

FIGURE 2

## CONSTRUCTION STANDARDS FOR ALL-PURPOSE TRAILS



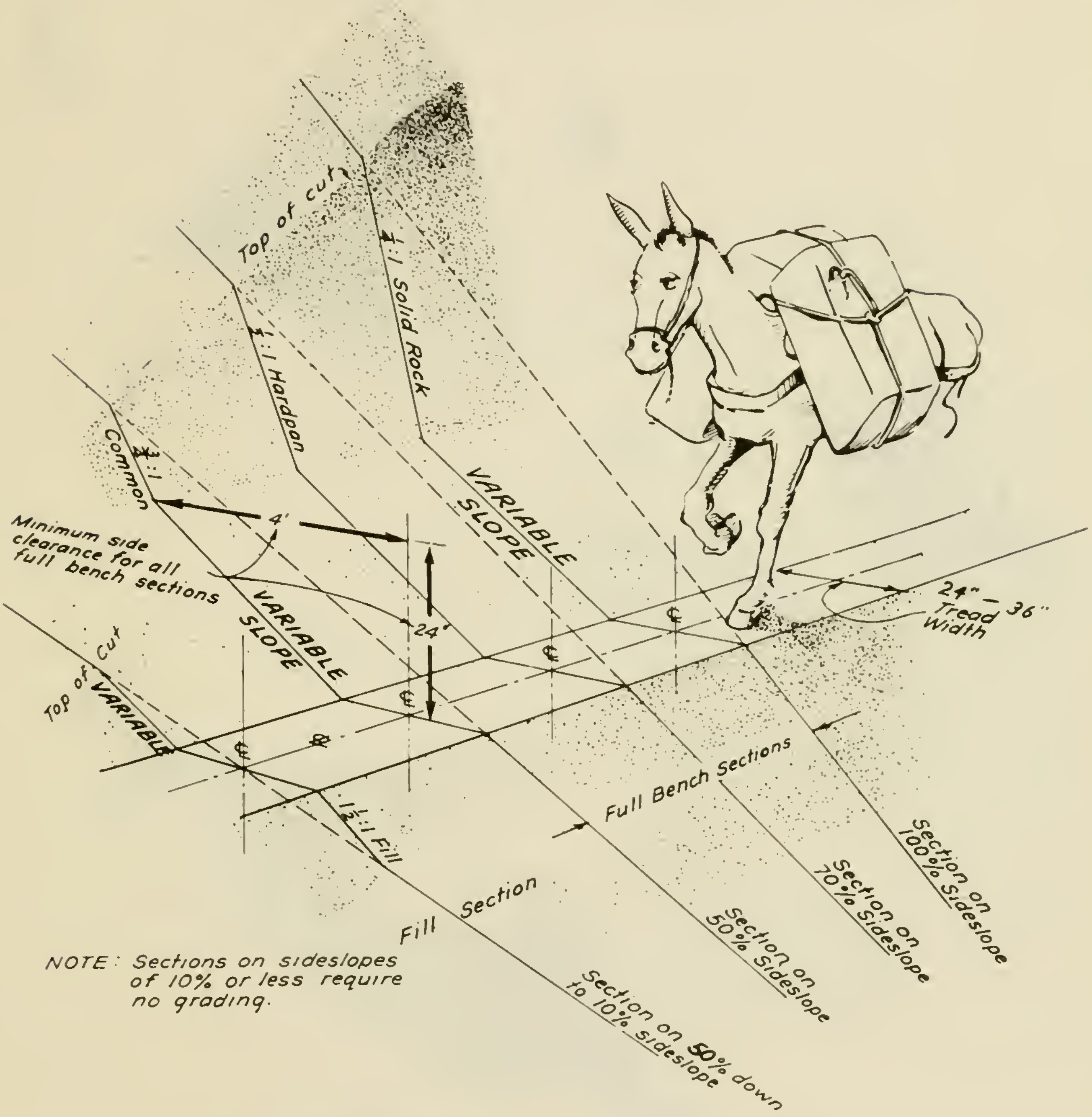
NOTE: Sections on sideslopes of 10% or less require no grading.

Adopted Office of [illegible] State Forester
June 1962

# TRAIL CONSTRUCTION DETAILS

FIGURE 2A

## CONSTRUCTION STANDARDS FOR ALL-PURPOSE TRAILS



NOTE: Sections on sideslopes of 10% or less require no grading.

Adopted Office of [illegible] r
June 1962

# TRAIL CONSTRUCTION DETAILS

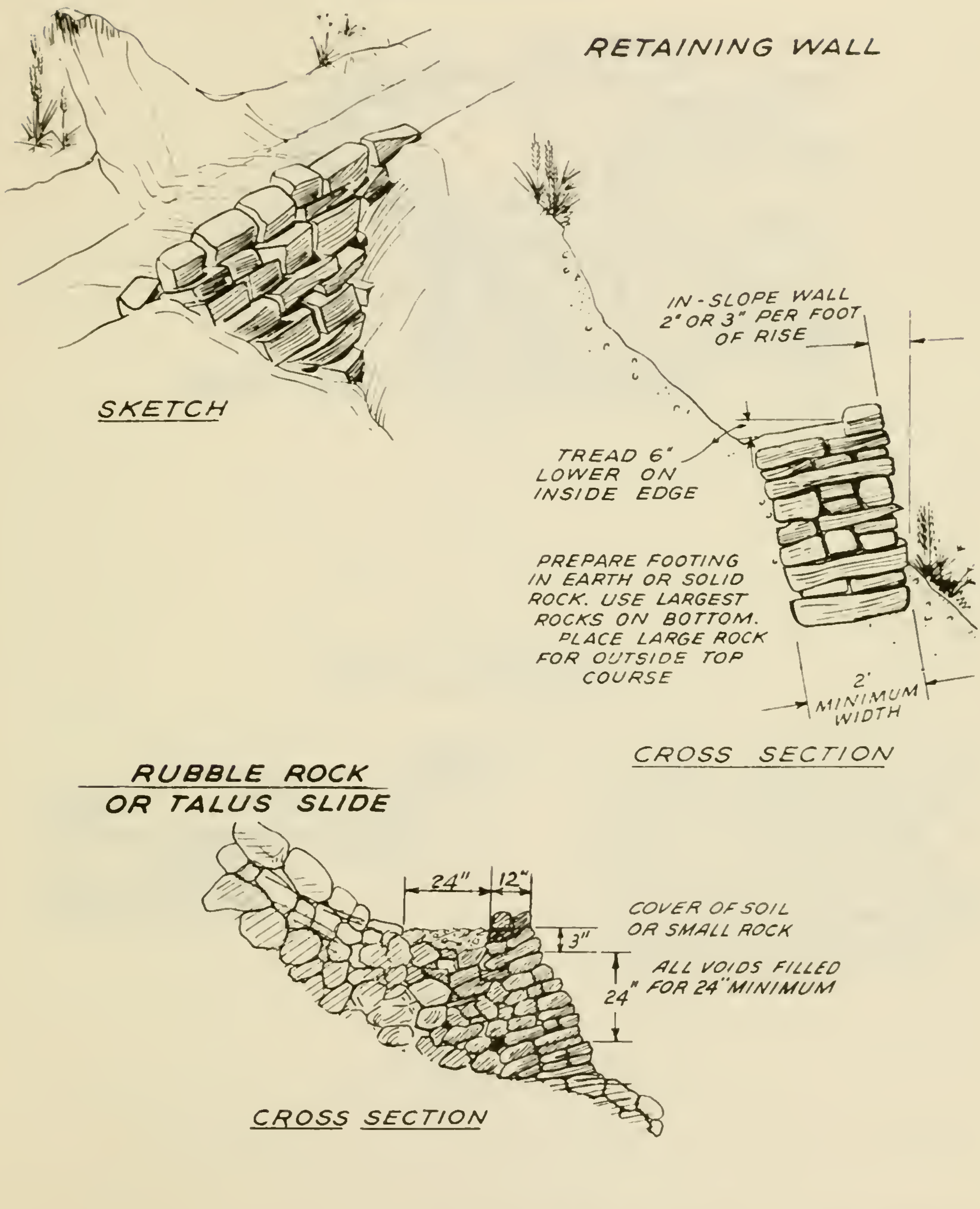

RETAINING WALL
SKETCH
IN-SLOPE WALL 2" OR 3" PER FOOT OF RISE
TREAD 6" LOWER ON INSIDE EDGE
PREPARE FOOTING IN EARTH OR SOLID ROCK. USE LARGEST ROCKS ON BOTTOM. PLACE LARGE ROCK FOR OUTSIDE TOP COURSE
2' MINIMUM WIDTH
CROSS SECTION
RUBBLE ROCK OR TALUS SLIDE
24"
12"
COVER OF SOIL OR SMALL ROCK
3"
ALL VOIDS FILLED FOR 24" MINIMUM
24"
CROSS SECTION

FIGURE 3

[illegible]
June 1969

## TRAIL CONSTRUCTION DETAILS

### TURNPIKE SECTION

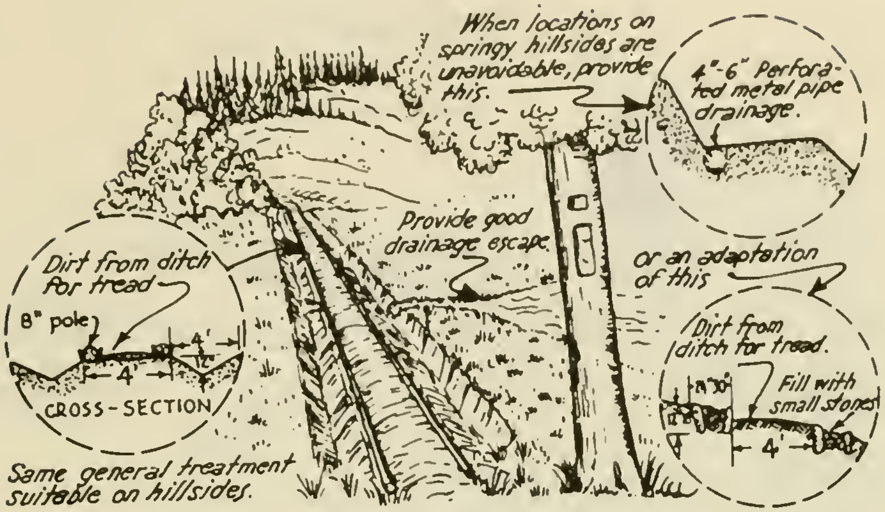
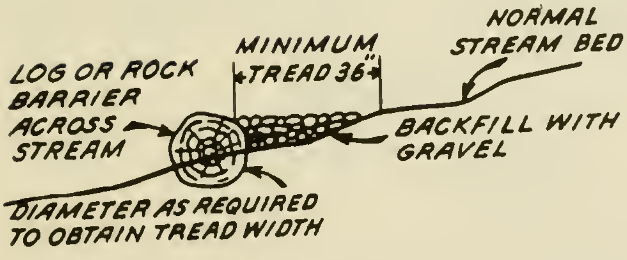

When locations on springy hillsides are unavoidable, provide this.
4"-6" Perforated metal pipe drainage.
Provide good drainage escape.
or an adaptation of this
Dirt from ditch for tread
8" pole
4'
4'
1/2'
CROSS-SECTION
Same general treatment suitable on hillsides.
Dirt from ditch for tread.
Fill with small stones
4'

FIGURE 4

### TYPICAL FORD SECTION


NORMAL STREAM BED
MINIMUM TREAD 36"
LOG OR ROCK BARRIER ACROSS STREAM
BACKFILL WITH GRAVEL
DIAMETER AS REQUIRED TO OBTAIN TREAD WIDTH

Where necessary provide a reinforcing apron below log barrier to prevent under cutting. If log barrier is used extend ends into bank at both ends. Imbed log or rock barrier $\frac{1}{2}$ diameter into stream bed.

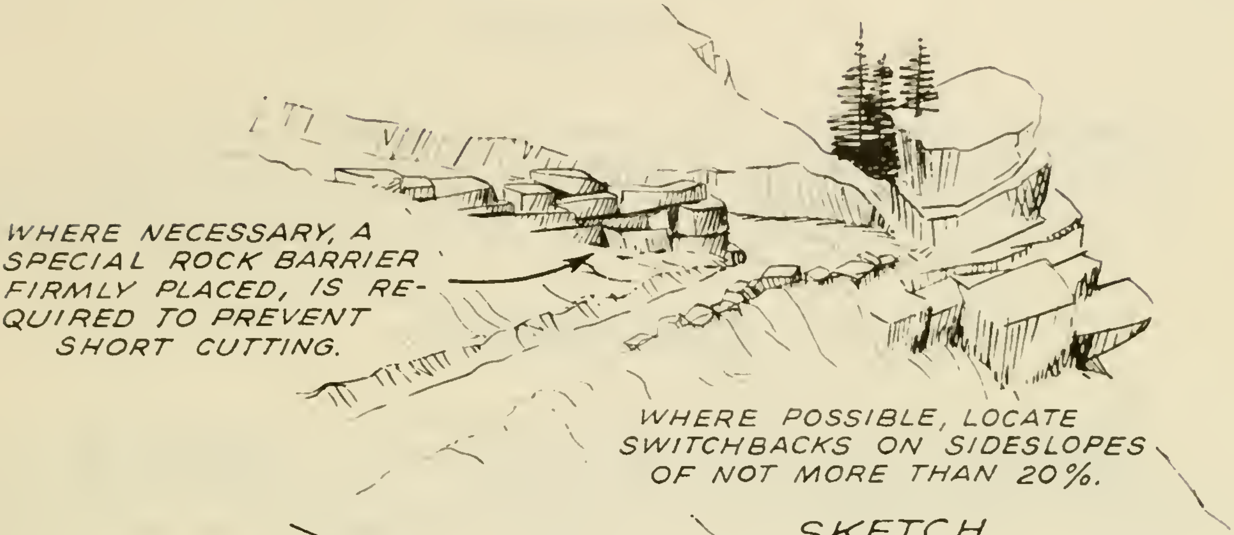
FIGURE 5

[illegible] Office of [illegible]
June [illegible]

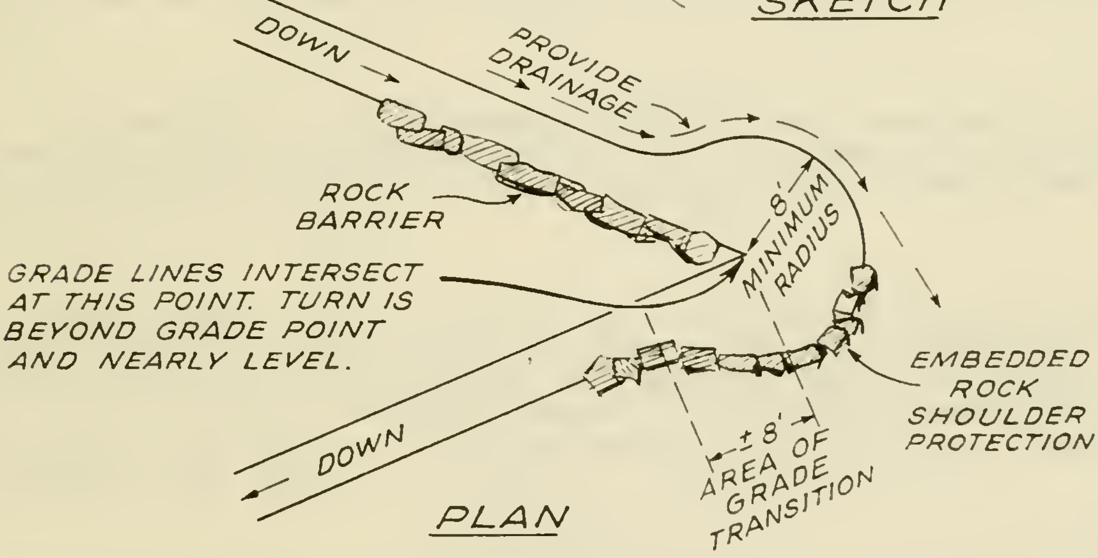
# TRAIL CONSTRUCTION DETAILS

FIGURE 6

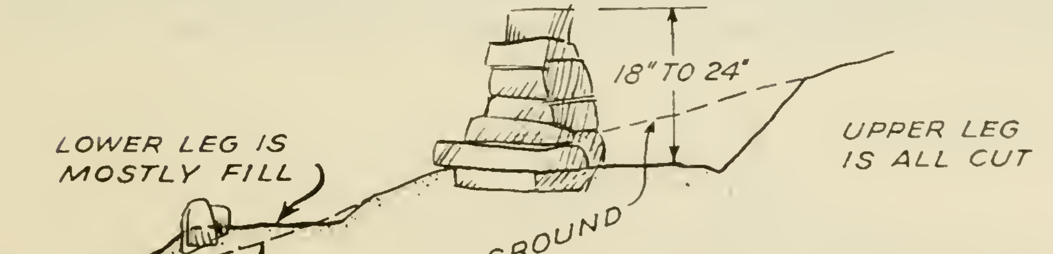
## SWITCHBACK


WHERE NECESSARY, A SPECIAL ROCK BARRIER FIRMLY PLACED, IS REQUIRED TO PREVENT SHORT CUTTING.
WHERE POSSIBLE, LOCATE SWITCHBACKS ON SIDESLOPES OF NOT MORE THAN 20%.

SKETCH


DOWN
PROVIDE DRAINAGE
ROCK BARRIER
GRADE LINES INTERSECT AT THIS POINT. TURN IS BEYOND GRADE POINT AND NEARLY LEVEL.
8' MINIMUM RADIUS
EMBEDDED ROCK SHOULDER PROTECTION
± 8' AREA OF GRADE TRANSITION
DOWN

PLAN



CROSS SECTION

Adopted: Office of Engineering State Forests on
June 1968

# WATER BARS - TRAILS SPECIFICATIONS

## Description

This item shall consist of the construction of water bars on a prepared trail tread for the satisfactory dispersing of water in accordance with these specifications, at locations shown on the drawings, or staked on the ground, and in conformity with the construction details.

## Construction Methods

Log Water Bar. A [illegible] to 8 inch diameter, peeled log shall be embedded into the trail tread so that the top of the log is flush with the trail tread on the downgrade side. The log shall be held firmly in place with solid stakes and well compacted backfill as shown in figure 8 of construction details.

After the log is firmly embedded, the upgrade trail tread shall be outsloped from the top of log at the inside end to the center of the log diameter at the outside end. The outsloping shall be tapered out at least 6 feet upgrade from the water bar.

Rock Water Bar. The drainage stop may be constructed of rocks embedded with tops flush with the downgrade trail surface and with approximately 4 inches of tread outslope and 6 feet of transition taper on the upgrade side of the water bar. Rectangular stones not less than 12 inches wide and 6 inches thick shall be firmly embedded and backfilled so as to form an effective water bar.

Slope Protection. Water bars shall be located and constructed so that surface water will discharge onto sideslopes which are stabilized by grass, brush, or rock whenever possible. Waterways on unstable soils shall be reinforced and protected by placing rocks or logs below the water bar outlet.

# TRAIL CONSTRUCTION DETAILS

FIGURE 7

## DRAINAGE DIP

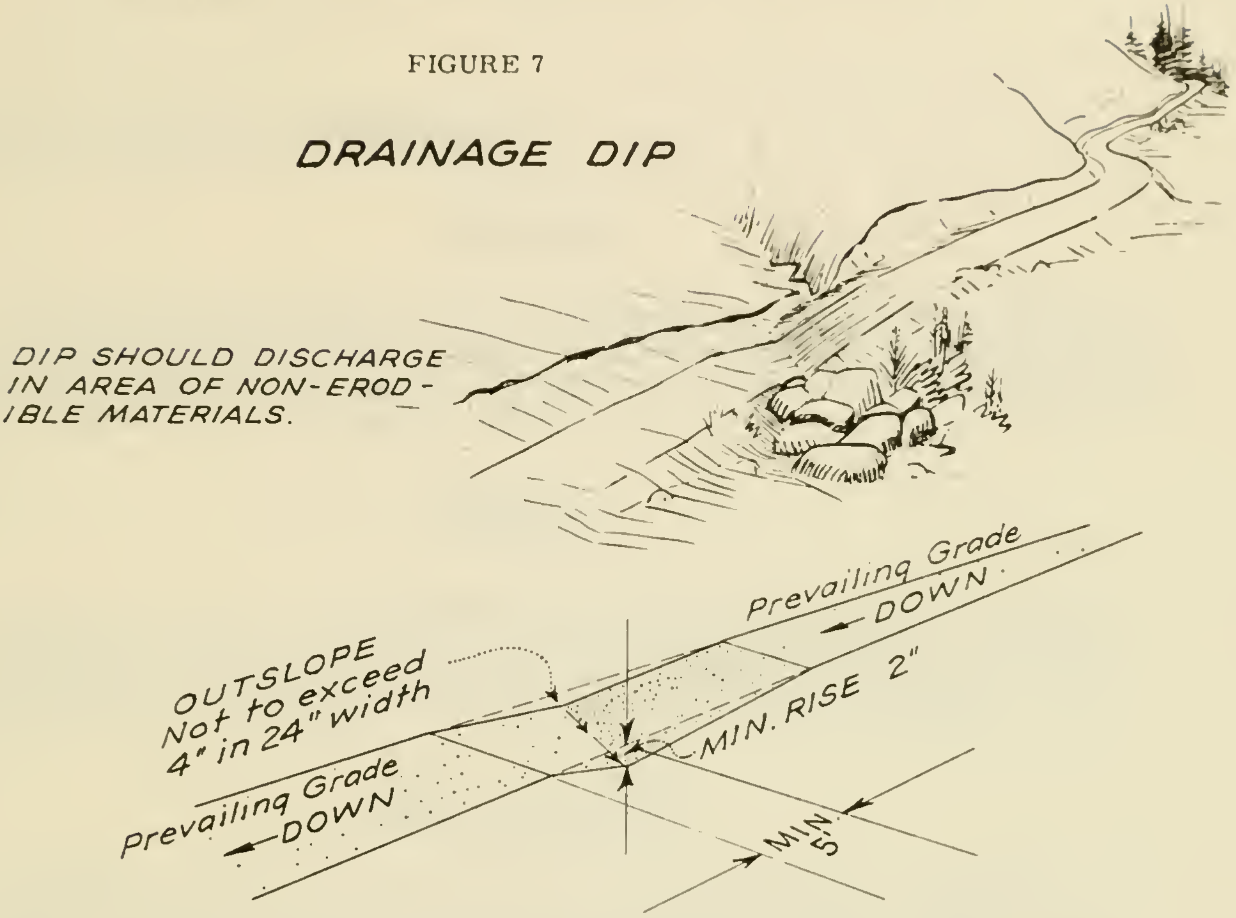
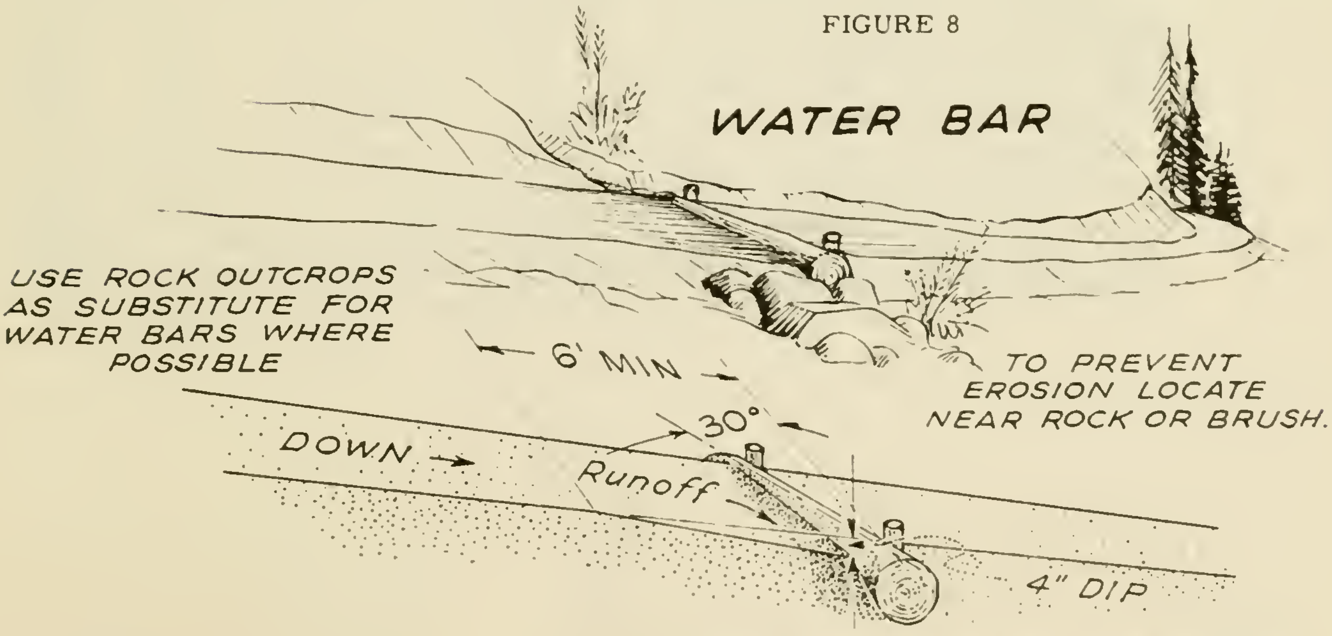


FIGURE 8

## WATER BAR


USE ROCK OUTCROPS AS SUBSTITUTE FOR WATER BARS WHERE POSSIBLE
6' MIN
TO PREVENT EROSION LOCATE NEAR ROCK OR BRUSH.
30°
DOWN
Runoff
4" DIP

[illegible]
June 1968

## ROCK DRAINS - TRAILS - SPECIFICATIONS

### Description

This item shall consist of the construction of rock drains in waterways at the locations shown on the drawings or staked on the ground, in accordance with these specifications, and in conformity with the structural requirements shown in figure 9 of construction details.

### Materials

Rock drains shall be constructed of sound, durable stones of not less than one-half cubic foot in volume, and 75 percent of the stones shall be at least one cubic foot in volume. Stones used in the top of the drain shall be reasonably flat and have a thickness of not less than 4 inches.

### Construction Methods

Excavation shall be made to expose a firm foundation for placement of sidewall stones which are to be firmly embedded at least 6 inches below the natural stream bed. Cover stones shall be long enough to bridge between outside faces of the sidewalls. All stones shall be selected and placed so as to fit snugly and have firm bearing on adjacent or underlying stones. Fill voids with rock spalls to prevent sifting of soil into the drain. Mineral soil backfill shall be thoroughly compacted by tamping with a tool not exceeding 12 square inches on the face. The rock drain shall be covered with a minimum loose thickness of 4 inches of selected cushion material, and drain crossing approaches shall be filled as necessary to provide a smooth transition with adjacent tread grades. The bottom of the drain shall be the natural stream bed, improved by removal of large rocks which would impede the flow of water.

## CULVERT PIPE - TRAILS - SPECIFICATIONS

### Description

This item shall consist of corrugated metal pipes, pipe-arches, and perforated pipe underdrains of the types, sizes, and gages shown on the drawings, furnished and installed at such places as are designated on the drawings or staked on the ground, in accordance with these specifications and in conformity with the lines and grades given.

### Materials

Pipe shall be galvanized metal or aluminum alloy formed in a full circle or an arch, with lock seams or lap joints fabricated by riveting or resistance spot welding. Half-round, nestable corrugated metal pipe is also acceptable when properly assembled in a full circle. All materials, fabrication, workmanship and marking for this item shall conform to Interim Federal Specification WW-P-00405 (June 26, 1963 revision of QQ-C-806a) or Interim Federal Specification WW-P-00402, whichever may apply. Corrugation may be either circumferential or helical.

### Construction Methods

Bedding. The pipe shall be bedded in a foundation of uniform density carefully shaped to fit the lower part of the pipe. Where unstable material is encountered at the established grade, such unstable material shall be removed to a depth of one foot below pipe grade and replaced with selected material to form adequate support for the pipe.

Placing. Culvert pipe shall be laid so that the cover from the top of pipe to trail tread surface shall be not less than 6 inches, and fill slopes shall be constructed as shown in figure 10 of construction details. Pipes with lap joints shall be laid with the outside laps of the circumferential joints pointing upstream and with the longitudinal joints on the sides.

Perforated metal pipe for underdrains shall be placed as indicated on the drawings or as directed.

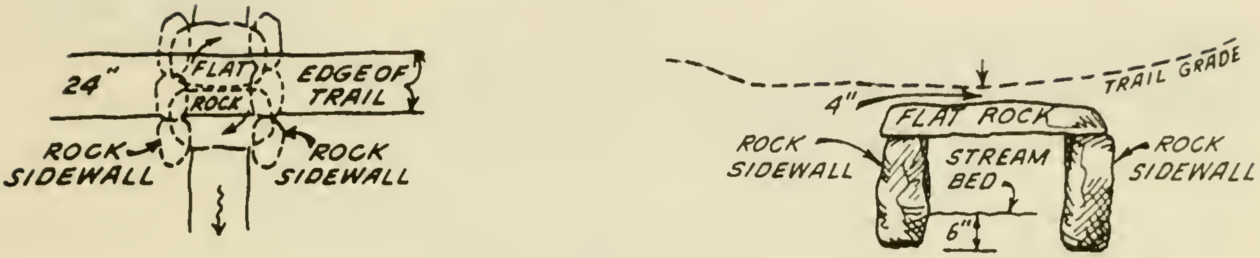
Backfilling. All culvert backfill material shall be placed in successive layers not exceeding 6 inches in depth and shall be thoroughly tamped for compaction of the backfill for at least one foot on each side of the pipe. This method of placement and compaction shall be continued until the backfill is in pace 6 inches above the top of the pipe.

Backfill for perforated pipe underdrains shall be selected material placed without compaction and as directed.

# TRAIL CONSTRUCTION DETAILS

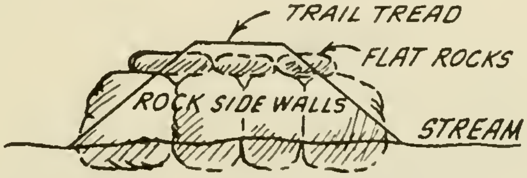
FIGURE 9

## TYPICAL ROCK DRAIN



PLAN

ELEVATION



CROSS SECTION

## PIPE CULVERT

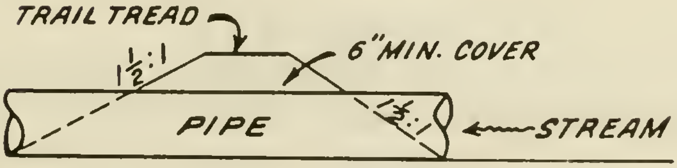


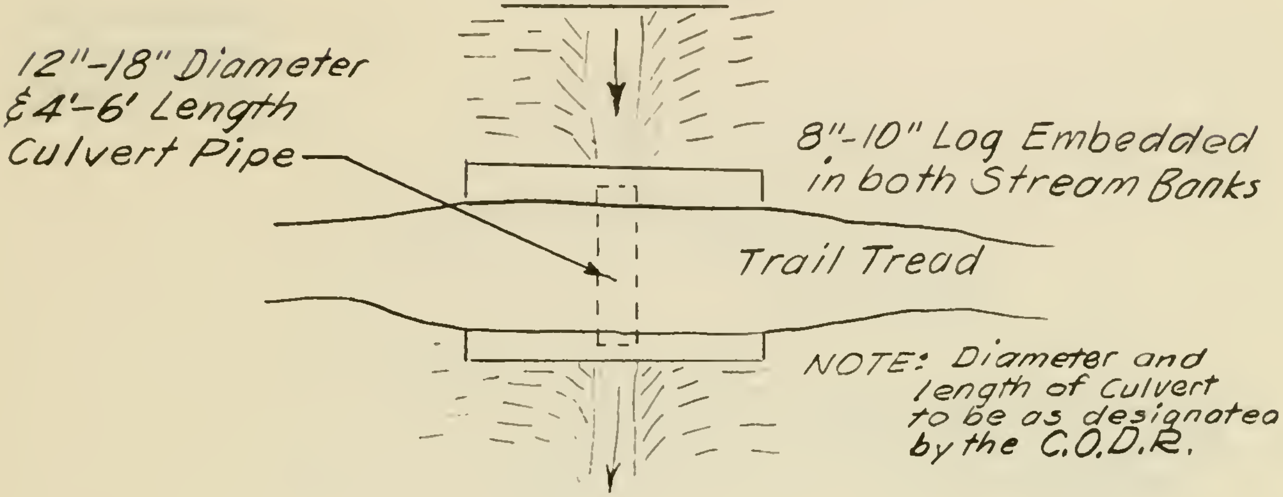
FIGURE 10

Adopted Office of Montana State Forester
June 1963

# TRAIL CONSTRUCTION DETAILS

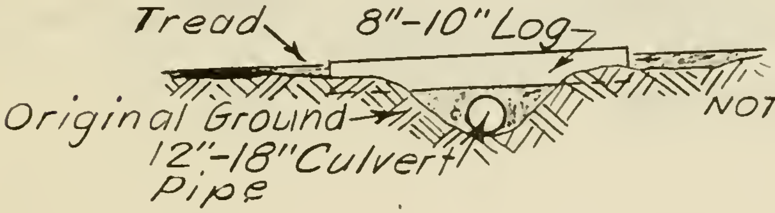
## CULVERT PIPE INSTALLATION

Plan View



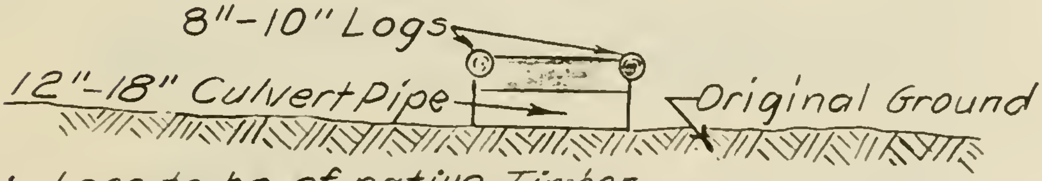
NOTE: Diameter and length of Culvert to be as designated by the C.O.D.R.

Profile



NOTE: Shaded Area is Fill

Cross-Section



NOTE: Logs to be of native Timber as approved by the C.O.D.R. A minimum of 1/2 Diameter of Log to overhang end of Culvert Pipe

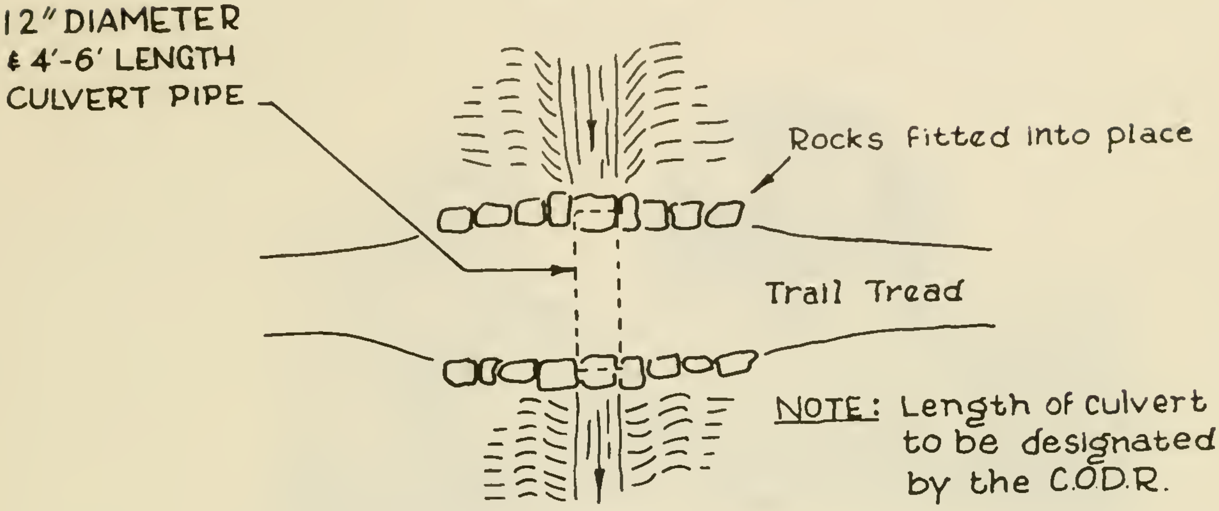
SCALE: 1" = 5'

FIGURE 10A

# TRAIL CONSTRUCTION DETAILS

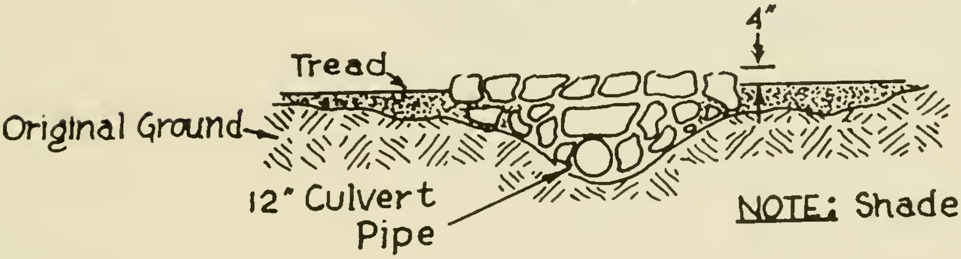
## CULVERT PIPE INSTALLATION

PLAN VIEW



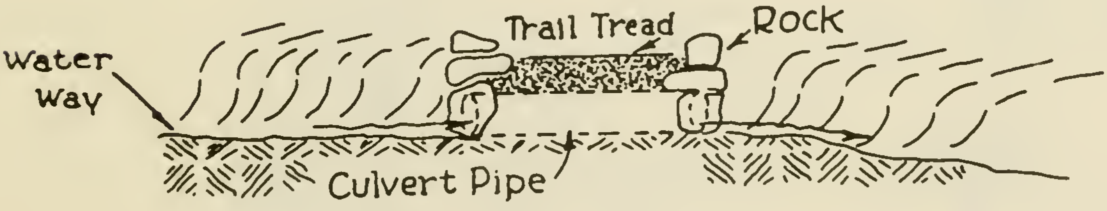
NOTE: Length of culvert to be designated by the C.O.D.R.

PROFILE



NOTE: Shaded area is fill.

CROSS-SECTION



NOTE: Minimum of ½" rock overhang at end of culvert pipe.

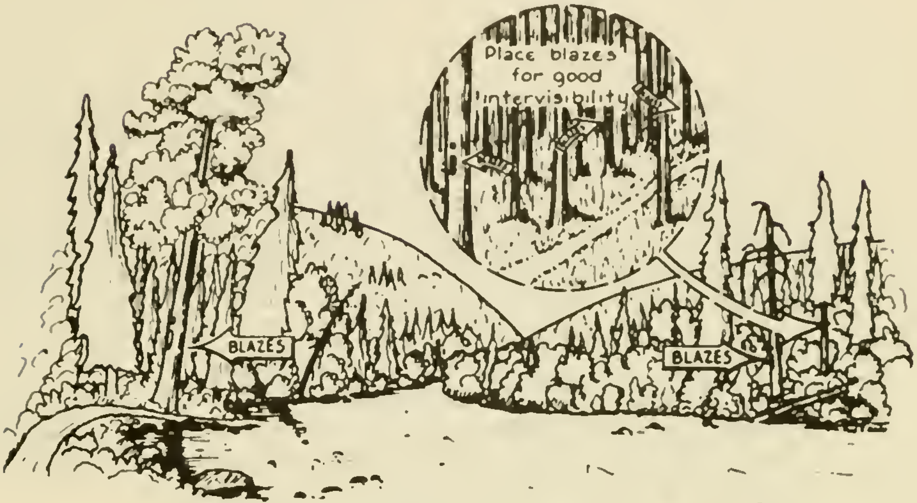
FIGURE 10B

Adopted Office of Montana State Forester
June 1968

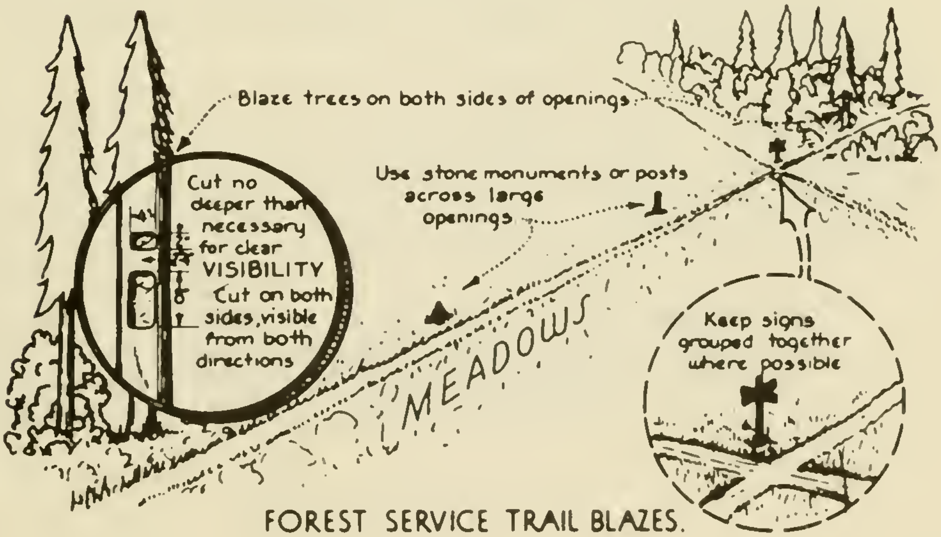
# TRAIL CONSTRUCTION DETAILS

FIGURE 11

## TRAIL MARKING



BLAZING AT STREAM CROSSINGS & IN TIMBER.



FOREST SERVICE TRAIL BLAZES.

## TRAIL PUNCHEON - SPECIFICATIONS

### Description

This item shall consist of the construction of log stringer and puncheon-deck bridging over marshy sections of the trail at locations indicated on the drawings or staked on the ground, in accordance with these specifications, and in conformity with the construction details.

### Materials

Native material of cedar, Douglas-fir, western larch, lodgepole pine, or Englemann spruce shall be used and fabricated in accordance with the dimensions and other requirements shown in figure 12 of construction details. All materials shall be neatly trimmed and cut with square ends. Logs for sills, stringers, and binding poles shall be peeled. Deck logs shall be securely fastened to stringers with 8" x 3/8" galvanized iron spikes; and stringers and binding poles shall be fastened in place with 1/4" drift pins.

Logs and other materials that meet the specifications shall be selected and approved before trees are felled and moved to the project site. All material is also subject to approval during fabrication and construction.

Limbs, bark, and other debris resulting from securing and fabricating native material shall be disposed of as directed.

### Construction Methods

*Excavation.* Mud sills shall be buried transversely level and to a depth whereby the finished deck surface shall be not more than 12 inches above the adjacent trail grade. Sills shall be placed so that the finished deck grade will be reasonably constant between the ends of the structure.

Stringers, decking and binding poles shall be placed in accordance with the requirements shown in figure 12 of construction details. Uniform lengths of decking shall be placed perpendicular to the structure centerline so that the ends give a straight line appearance to the edges of the structure. Binding poles shall be not less than 10 feet in length, and pole ends shall be tied to the stringers by a double wrap of No. 9 galvanized wire.

*Approaches.* Approach ramps shall be constructed at each end of the puncheon structure to provide a smooth transition from the adjacent trail tread to the deck surface. Materials for these ramps shall be granular, mineral soil, or hand-placed rock with suitable cushioning.

## LOG CULVERTS - TRAILS - SPECIFICATIONS

### Description

This item shall consist of construction of log culverts for small stream crossings at locations indicated on the drawings or staked on the ground, in accordance with these specifications and in conformity with the construction details.

### Materials

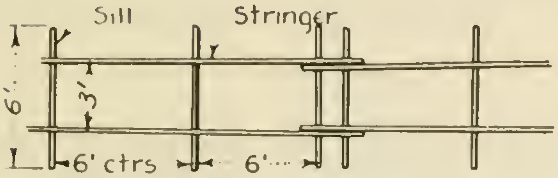
Native materials of cedar, Douglas-fir, western larch, lodgepole pine, or Englemann spruce shall be used and fabricated in accordance with the minimum dimensions and other requirements shown in figure 13 of construction details. All materials shall be neatly trimmed, peeled, and cut with square ends.

### Construction Methods

All foundation logs shall be placed on a reasonably smooth bedding of fine gravel. Selected mineral soil backfill shall be placed in successive layers not exceeding 6 inches in depth and shall be thoroughly compacted by hand tamping with a tamping tool not exceeding 12 square inches on the face.

Approaches. Approach ramps shall be constructed as necessary for smooth transition from adjacent trail grade to the culvert crossing, and approaches shall be constructed so as to prevent washing of the trail tread adjacent to culverts.

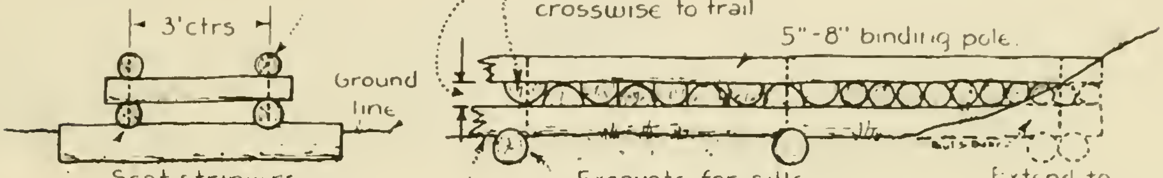
# TRAIL CONSTRUCTION DETAILS



Lay stringer ends side by side at joints - on double mud sills Stringers and sills at least 8" in diameter Peel all logs

SILL & STRINGER LAYOUT.

*Use most durable species available cedar fir, larch, pine, spruce in that order*



Spike deck to stringers with ¼" drift pins

5" min split or round flooring, 4' long, always crosswise to trail

5"-8" binding pole.

Seat stringers into sills.

Excavate for sills. Other timbers above ground

Extend to dry ground.

*Place so sills and stringers are always wet, if possible*

END SIDE VIEW

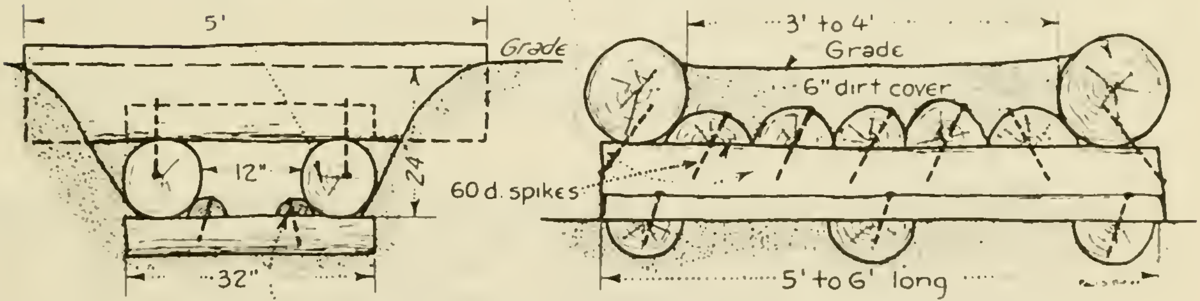
CORDUROY OR PUNCHEON CONSTRUCTION

**FIGURE 12**

*Use most durable species available cedar, fir, larch, pine, spruce – in that order*

Large logs to hold fill and act as guard

10" min logs and half logs



60 d. spikes

5' to 6' long

4" split log held with 40d. spikes.

END SECTION

LOG CULVERT

**FIGURE 13**

[illegible] Office of [illegible]
June 1969

## LOG BRIDGES - TRAILS SPECIFICATIONS

### Description

This item shall consist of log bridges fabricated and constructed in accordance with these specifications, in conformity with the requirements shown in figures 14 and 15 of construction details, and at the locations shown on the drawings or staked on the ground.

### Materials

All structural timbers shall be sound, native material of Douglas fir, western larch, or other species as provided in the supplemental specifications. All logs shall be peeled, cut with square ends, and fabricated in accordance with the dimensions and requirements shown in figures 14 and 15 of construction details.

### Trail Bridge Stringers

*Minimum Dimensions for 4-Stringer Construction Using Douglas Fir or Western Larch Only.

| Span in Feet | Log Top Diameter |
|---|---|
| 8 | 6" |
| 10 | 7" |
| 12 | 8" |
| 14 | 9" |
| 16 | 10" |
| 18 | 10" |
| 20 | 11" |

*Approval to use other tree species and the minimum allowable dimensions shall be as provided in the supplemental specifications.

Logs and other materials that meet the specifications shall be selected and approved before trees are felled and moved to the project site. All material is also subject to approval during fabrication and construction.

Limbs, bark, and other debris resulting from securing and fabricating native materials shall be disposed of to the satisfaction of the landowner or as directed.

Hardware. Low-carbon steel drift pins shall be used to fasten stringers and abutment members in place. Drift pins with heads shall be used to fasten log curbs to deck and stringers. Common wire nails shall be used to fasten log curbs to deck and stringers. Common wire nails shall be used for fastening deck materials and constructing guard-railing. All hardware shall be of a size sufficient for penetration into holding members at least one and one-half times the thickness of the held members, or as directed.

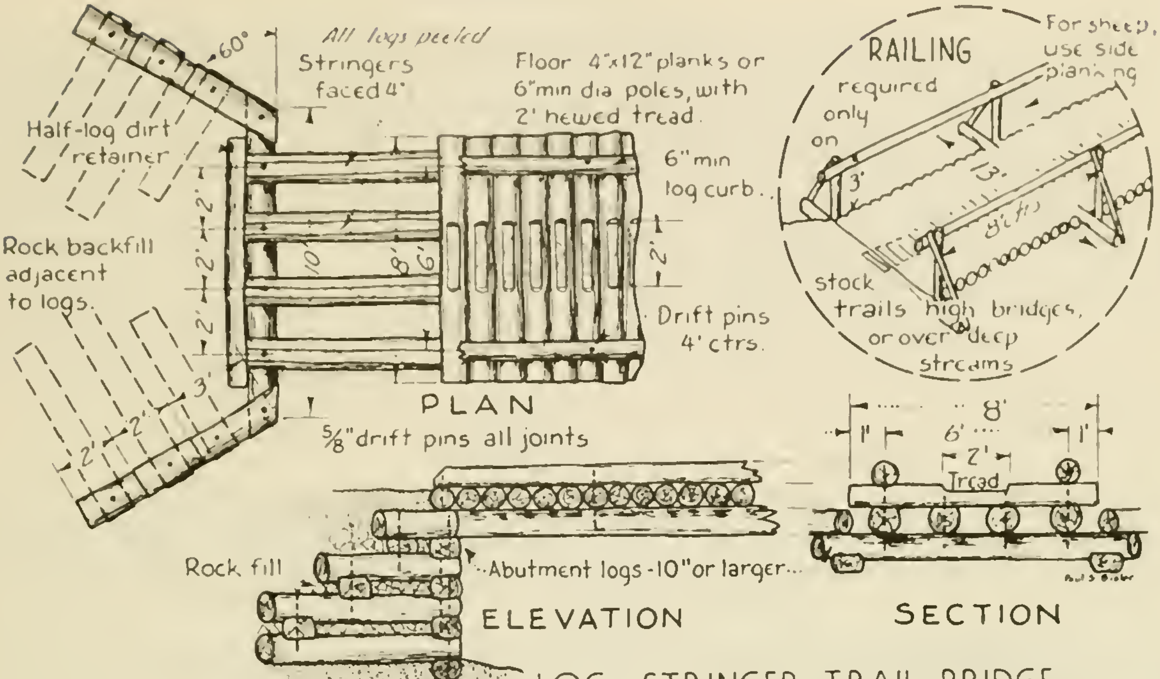
## Construction Methods

Excavation for all abutments and piers shall be such that all footing members are placed at least 12 inches below the natural stream bed and on a level, solid foundation. Additional footing depths may be required to prevent substructure scouring.

Workmanship. All framing shall be true and accurate so as to provide a snug fit and firm bearing between structure members. Deck members shall be cut to uniform lengths and placed so that the ends give a straight line appearance to the edges of the structure. Curbing logs shall be of full structure length or not less than 8 feet in length, and log ends shall be securely tied to stringers with a double wrap of No. 9 galvanized iron wire.

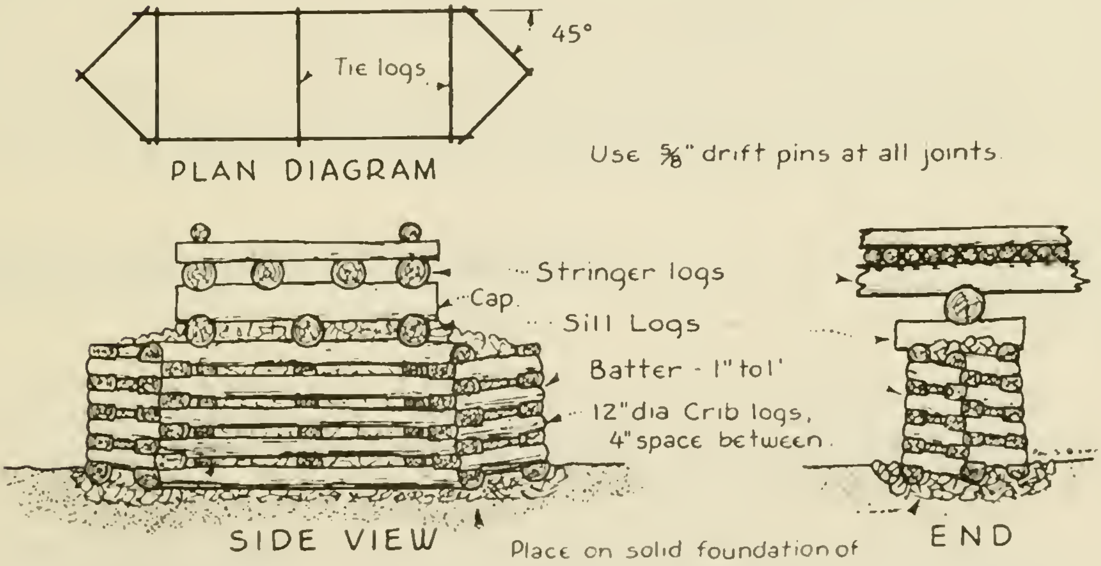
Backfill. All backfill for piers and abutments shall be selected rock of a size that will not pass through the spaces between crib logs, and will also provide a reasonably dense mass. Bridge approaches shall be surfaced with a course of selected cushion material not less than 4 inches in depth after compaction.

# TRAIL CONSTRUCTION DETAILS


60°
All logs peeled
Stringers faced 4"
Floor 4"x12" planks or 6" min dia poles, with 2' hewed tread.
6" min log curb
Half-log dirt retainer
Rock backfill adjacent to logs.
2'
2'
2'
10'
8'
6'
2'
Drift pins 4' ctrs.
3'
2'
2'
PLAN
5/8" drift pins all joints
RAILING required only on stock trails high bridges, or over deep streams
For sheep, use side planking
3'
13'
8' ctrs
8'
1'
6'
1'
2'
Tread
Rock fill
Abutment logs - 10" or larger
ELEVATION
SECTION

LOG STRINGER TRAIL BRIDGE

FIGURE 14



Use 5/8" drift pins at all joints.

Use size stones that will not wash out

Place on solid foundation of big boulders or bedrock, or put floor in crib

PIER FOR TRAIL BRIDGE

FIGURE 15

## MAINTENANCE OF TRAIL TREAD SPECIFICATIONS

### Description

This item shall consist of restoration of the trail tread to as near the original standard of construction as is practicable. It shall include removal from the tread of all limbs, slough material, soil berms, and exposed rocks; the repair of crib walls, switchbacks, barriers and safety berms; and the restoration of fill shoulders to widths consistent with adjacent trail tread widths. These specifications also shall apply to alternate sections of trail used as turnouts or resting places.

Trail blazes and markers shall be restored in the areas indicated on the drawings and in conformity with the requirements of figure 11 of the construction details.

### Methods

All loose rocks over two inches in diameter shall be removed from the trail tread. Imbedded rocks shall be pried out or blasted to a depth of at least 6 inches below the tread grade, and the resulting holes shall be filled with mineral soil tamped in place.

Ruts, erosion gullies, and water pockets in the trail tread shall be drained and filled with mineral soil so that the finished trail tread is outsloped at the ratio of one inch per foot of tread width.

Slough material and soil berms shall be removed and spread over the entire width of the trail tread so that the finished surface is outsloped at the ratio of one inch per foot of tread width.

Fill approaches at the ends of bridges and puncheon sections shall be restored with granular, mineral soil so that the finished trail tread is not more than 6 inches below the structure deck surface.

## MAINTENANCE OF TRAIL STRUCTURES SPECIFICATIONS

### Description

This item shall consist of the restoration, repair, and installation of foot-crossing structures, trail puncheon, culverts, rock drains, water bars, and bridges which are listed and identified on the drawings by geographical names or mile locations and located as staked on the ground.

Classification of Work. The work to be performed is shown on the drawings for each structure. The various types of structures are identified in the supplemental specifications by number suffixes of this item number.

### Methods

The supplemental specifications refer to the standard trail construction specifications and details which are applicable to work on each type of structure.

## TRAIL MAINTENANCE (CLEARING AND GRUBBING) SPECIFICATIONS

### Description

This item shall consist of clearing and grubbing in accordance with these specifications and in conformity with the lines, dimensions, and requirements shown in figure 1 of the construction details.

### Methods

All logs, trees, limbs, and brush shall be removed from the area extending 10 feet above the trail tread and a minimum of 4 feet on each side of the trail centerline. Exposed roots which are within the graded trail tread shall be removed.

Widening. Additional width of clearing may be required at designated turnouts, water holes, or resting places.

Leaning Trees and Snags. Hazard trees and snags which are marked for removal shall be felled and removed outside of the clearing area. Unless otherwise provided in the supplemental specifications, selective removal of hazard trees and snags shall be accomplished.

Disposal of Refuse. All logs, limbs, brush, roots, and other debris shall be scattered outside of the cleared area, unless otherwise provided in the supplemental specifications. Logs or other debris on the slope above the trail shall be firmly anchored to prevent sliding onto the trail or shall be removed to the slope below the trail.

## MAINTENANCE OF TRAIL DRAINAGE FACILITIES SPECIFICATIONS

### Description

This item shall consist of the restoration, repair and installation of drainage dips and fords which are listed and identified on the drawings by geographical names or mile locations and located as marked on the ground. This item shall also include cleaning and shaping ditches, culverts, culvert catch basins, and water bars.

### Methods

Drainage dips shall be installed or cleaned and shaped in conformity with the requirements shown in figure 7 of construction details.

Shallow stream fords shall be restored or installed by placing logs or large rocks on the downstream side of the crossing and placing tread material in conformity with the requirements shown in figure 5 of construction details.

All ditches, culverts, and culvert catch basins shall be opened and cleaned to provide effective drainage. Eroded banks adjacent to culverts and stream fords shall be reinforced with rock suitable for trail tread protection.

Water bars shall be shaped in conformity with the requirements shown in figure 8 of construction details.

## TRAIL TREAD RESTORATION SPECIFICATIONS

### Description

This item shall consist of restoration of the trail tread to as near the original standard of construction as practicable, in accordance with these specifications and at the locations shown on the drawings and staked on the ground. It shall include all clearing and grubbing required to repair the trail, including removal and disposal of trees, sticks, brush, or any debris in slough material, and in trail reconstruction; removal from the tread of all slough material; repair and grading of slipped or eroded trail tread; placement of selected borrow to construct turnpike sections and as cushion over rock; repair or reconstruction of damaged or obliterated stream fords, drainage dips, crib retaining walls, and safety berms; cleaning of culvert pipes, catch basins and drainage ditches. These specifications shall also apply to alternate sections of trail used as turnouts or resting places.

### Methods

All clearing and grubbing and all excavation or trail tread reconstruction, including obtaining and placing selected borrow, shall be done in accordance with these specifications and the specifications for construction of these items.

Selected borrow material may be borrowed from banks adjacent to the trail where approved. Such borrow areas shall be left with neatly dressed backslopes that blend smoothly with the adjacent backslopes.

Cleaning culvert pipes, catch basins, and drainage ditches. This work shall consist of: removing from culvert pipes, all dirt, rocks, sticks, leaves, and any other foreign material so as to provide a clean, unobstructed pipe; cleaning out catch basins at culvert inlets to provide at least a 2-foot square basin, with the bottom of the catch basin excavated level with the bottom of the pipe at the inlet; cleaning rock and other soil and debris from existing drainage ditches to provide unobstructed flow in the ditches. All material removed in the cleaning shall be cast aside from the trail unless directed to be used to build up the trail tread.

## RECONSTRUCTION OF TRAIL SPECIFICATIONS

### Description

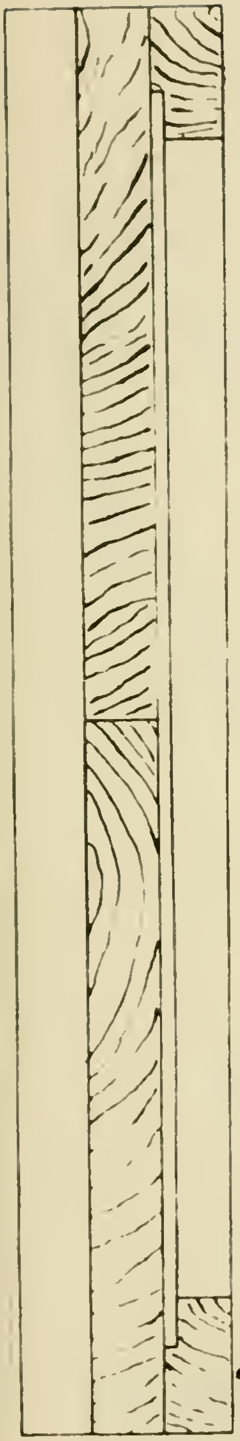
This item shall consist of reconstruction of destroyed sections of trail at the locations shown on the drawings and staked on the ground. It shall include all clearing and grubbing, tread construction, and selected borrow tread cushioning. All work in this item shall be done in conformity with the trail construction specifications and details set forth in the supplemental specifications.

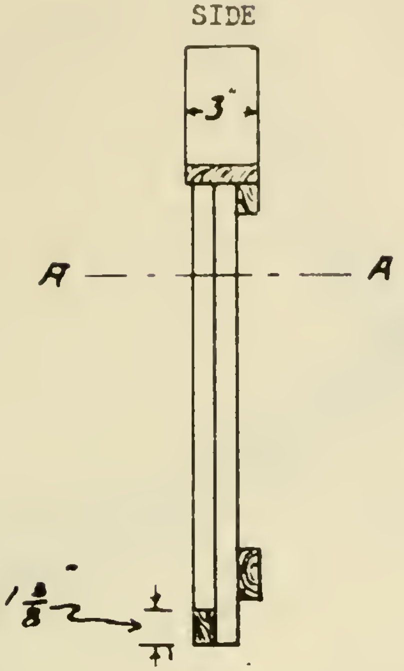
### Methods

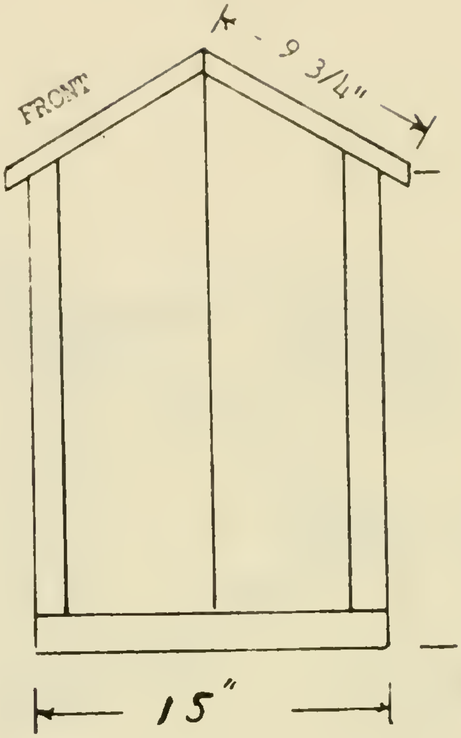
The supplemental specifications refer to the standard trail construction specifications and details which are applicable to all work performed under this item.

# CFFP POSTER BOARD SPECIFICATIONS

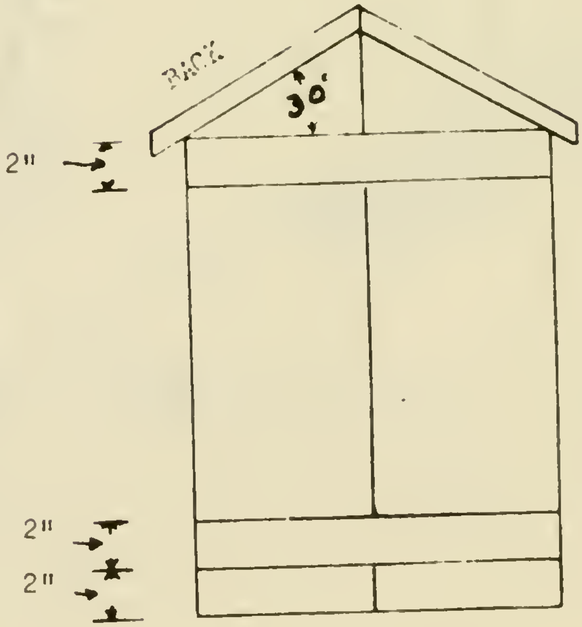
age 1 of 1







Poster board will be built from 3/4" pine lumber dressed. 1' x 8" make the best back. They can vary in width from 15¼" to 14 7/8". They are nailed together with 6D nails, clinched on backside of board.



Cleat 1 3/8 wide with plowed slot 1/8" x 1/2" to hold poster.

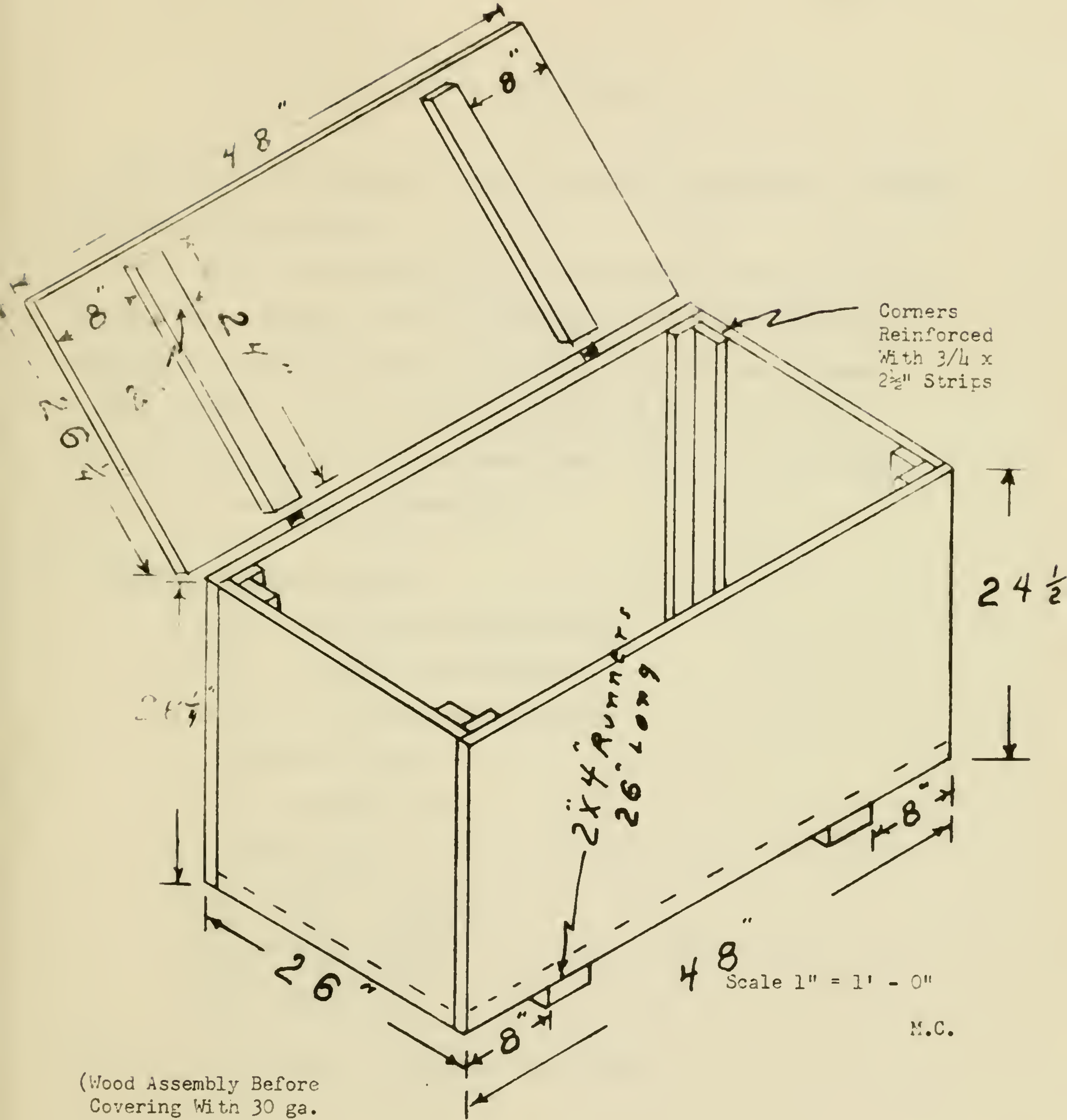
CROSS-SECTION
A——A

Scale: 6" = 1' - 0"

Scale: 1½" = 1' - 0"

# PICKUP BOX SPECIFICATIONS

Page 1 of 2



Corners Reinforced With 3/4 x 2½" Strips

Scale 1" = 1' - 0"

M.C.

(Wood Assembly Before Covering With 30 ga. Galvanized Iron)

## PICKUP BOX SPECIFICATIONS

The sides of these boxes are covered with 30 ga. galvanized iron covering 3/4" at top and bottom edges.

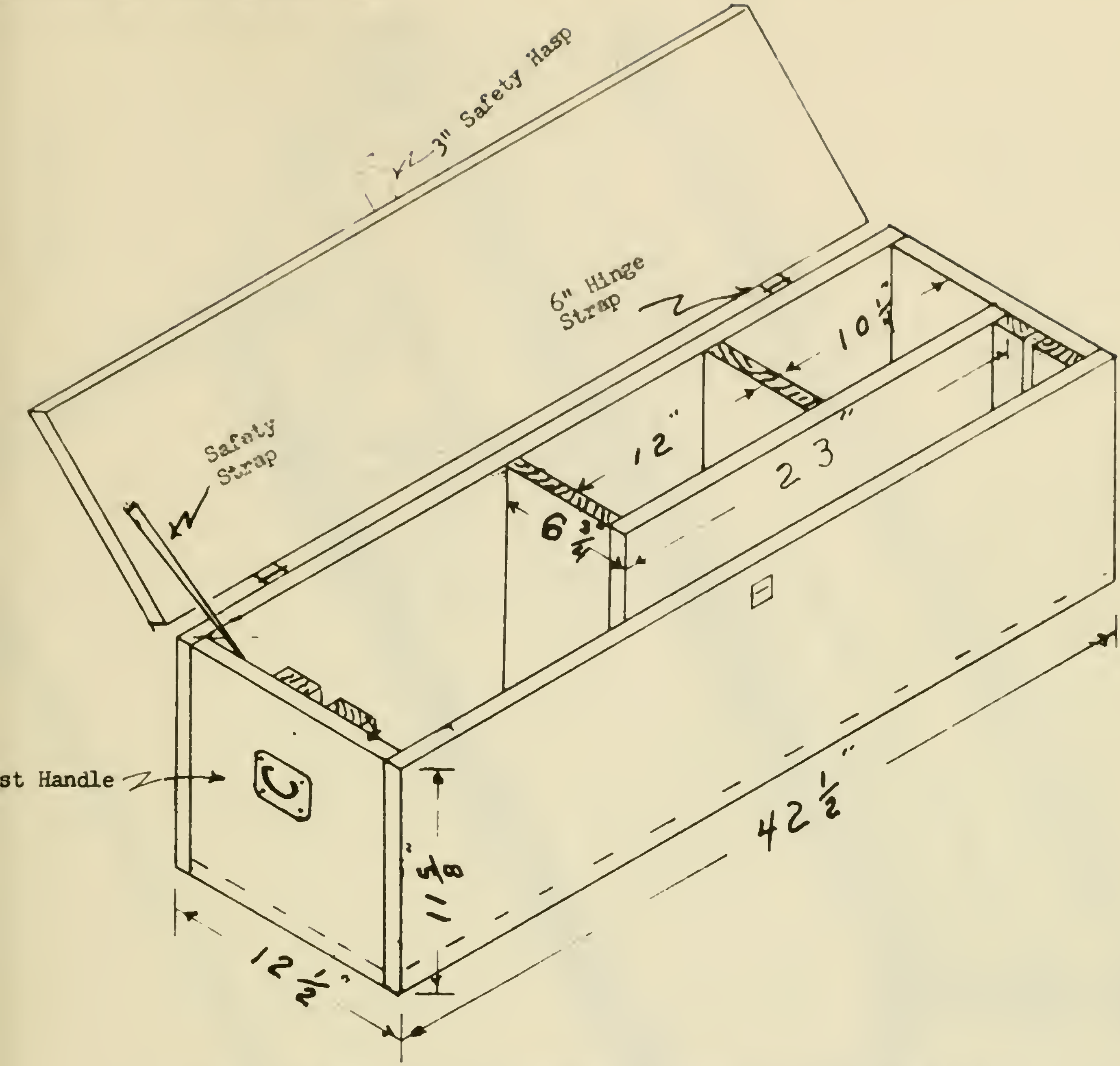
The top of the lid is covered with the iron covering the edge and coming 3/4" over the bottom edge. All of the galvanized iron is fastened with 3D galvanized nails with the heads soldered fast. All joints are soldered. The wood assembly is nailed with 6D box nails and reinforced with flat head wood screws. Hinges, hasp and chest handles are put on top of galvanized iron with screw heads soldered fast.

Hardware Needed for One Box

2 sheets 3' x 8' 30 ga. galvanized iron
1 box #8 x 1¼" flat head wood screws
1 box #8 x 1 3/4" flat head wood screws
1 lb. acid core solder
2 lbs. 3D galvanized nails
2 lbs. 6D box nails
1 pair 6" light strap hinges
1 pair 3½" chest handles
1 only 4" safety hasp

The preferred lumber to use is pine center match.

# ECIFICATIONS FOR CHAINSAW BOXES

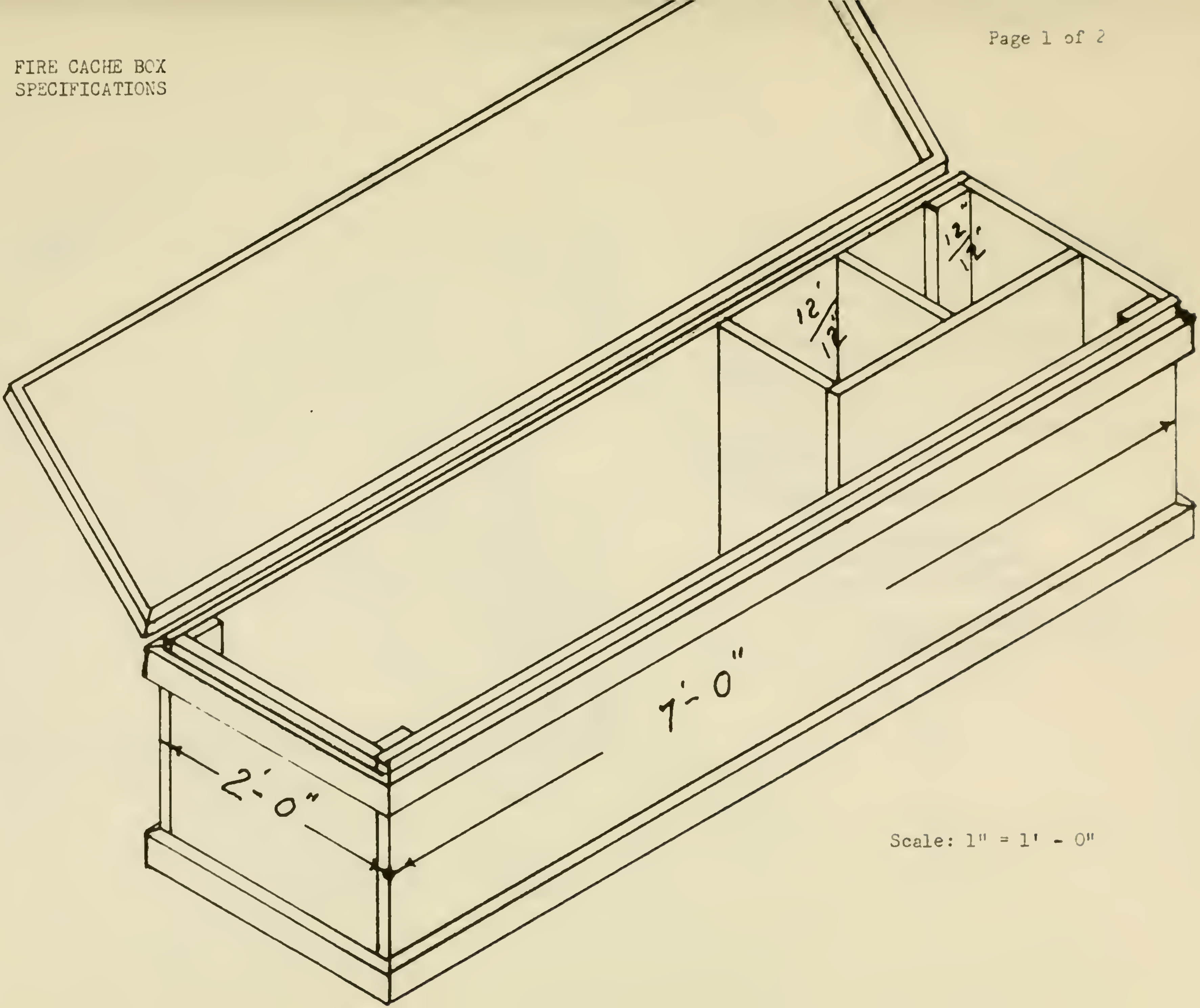


Saw boxes must be fit to each make of saw. The box shown will fit a McCulloch 1-10 with bow bar or 24" straight bar. It has an inside measurement of 41" x 11" x 10 7/8" deep.

All joints are nailed and reinforced with wood screws.
The safety strap can be a short piece of strap or nylon rope.
Block should be put in each end of box to hold the saw in place.
1" x 12" dressed pine lumber.
1 box #8 x 3/4" flat head wood screws.
1 pr. 6" light strap hinges.
1 pr. 3 1/2" chest handles.
1 only 3# safety hasp.
1 lb. 6D box nails.

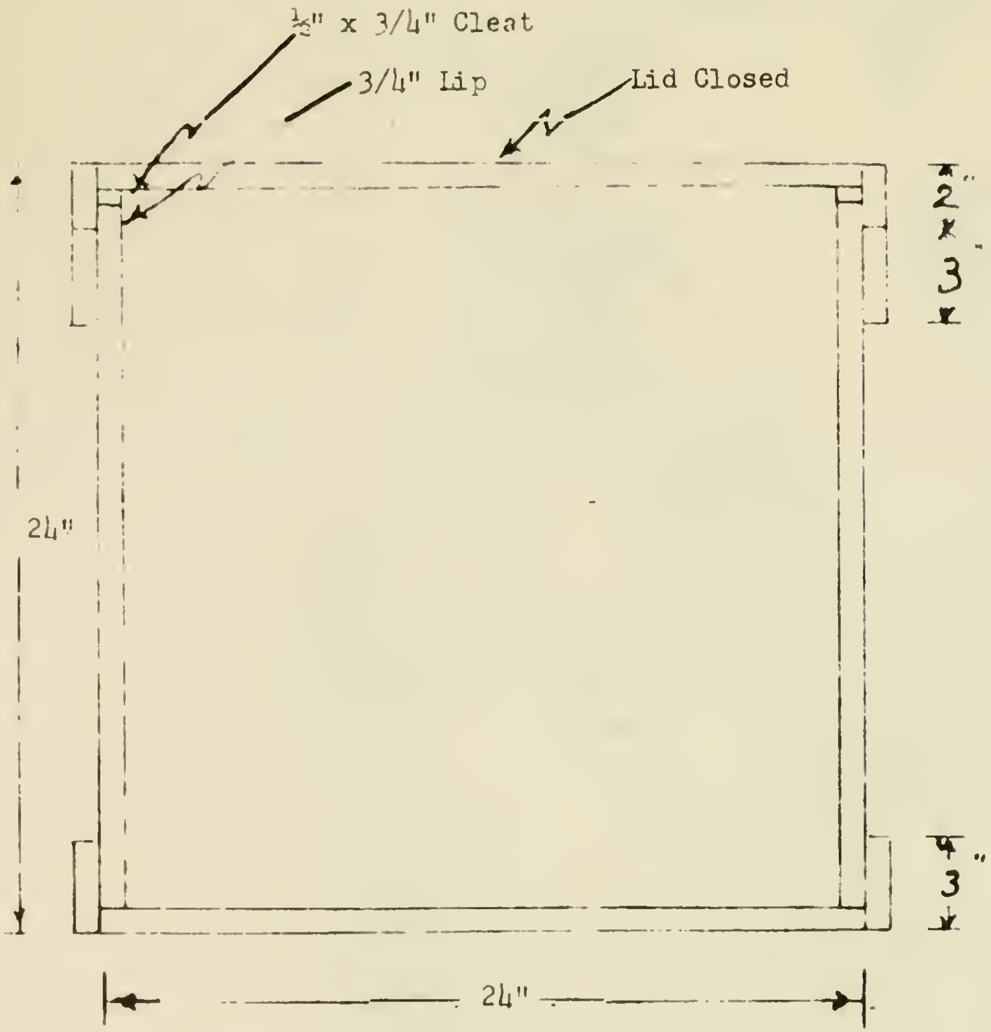
Scale: 1½" = 1' - 0"

FIRE CACHE BOX
SPECIFICATIONS



Scale: 1" = 1' - 0"

(Cross Section)



Scale: 2" = 1'-0"

These boxes are built of dressed pine 3" center matched preferred, and bound with S 4 S pine. This box can be reinforced by putting cleats across bottom and top.

Recommend 3 each 24" x 3 5/8" top and bottom. These cleats are not shown in drawing.

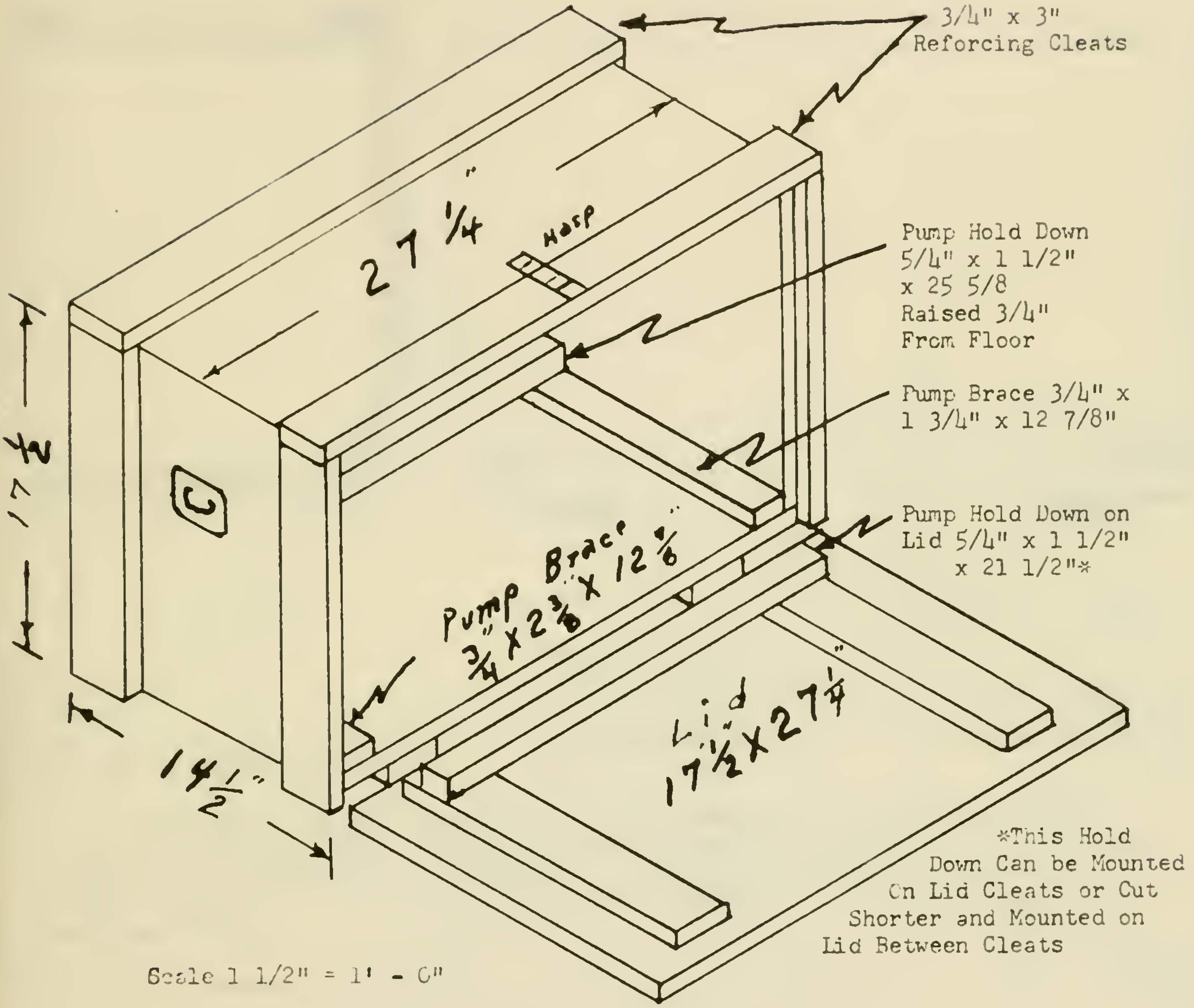
All joints in this box are nailed and reinforced with screws.

Hardware needed for one box:

3 lb. 6D coated nails
1 box #8 x 1½ screws
1 box #8 x 1 3/4 screws

3 each 6" light T hinges
1 only 4" hasp

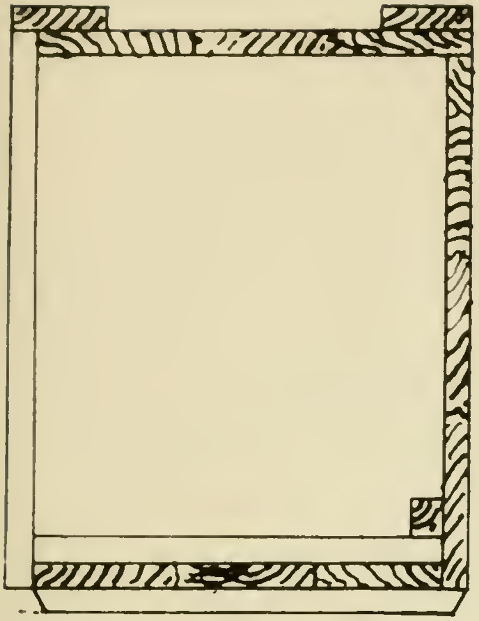
# PUMP BOX SPECIFICATIONS



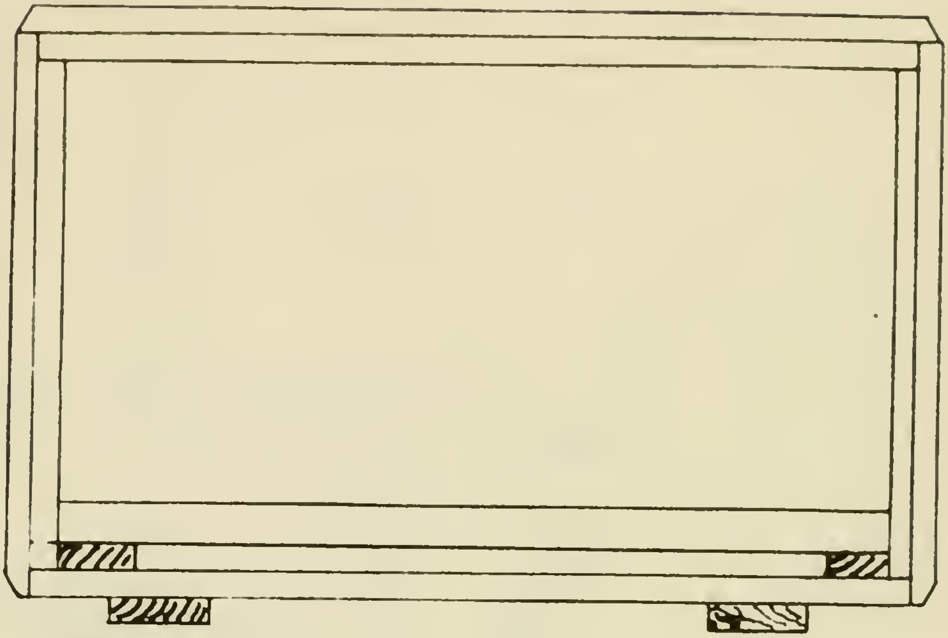
Scale 1 1/2" = 1' - 0"

## PUMP BOX SPECIFICATIONS
## COSS SECTIONS

Front to Back



End to End



Scale 2" - 1' - 0"

### PUMP BOX

The pump box shown will fit a Pacific Type Y pumper. It has inside dimensions of 25 5/8" x 12 7/8" x 15 7/8".

It is covered with 30 gage galvanized iron fastened with 3D galvanized nails: top, three sides and lid. All seams and nail heads soldered 3/4" x 3" reinforcing cleats cover all joints in iron covering. Lumber used should be pine center matched preferred. All joints nailed with 6D box nails, reinforced with flat head wood screws.

Hardware Needed for One Box

1 sheet 3' x 8" gage galvanized iron
1 box #8 x 1 1/4 flat head wood screws
1 lb. 3D galvanized nails
1 lb. 6D box nails
1 pair 3 ½" chest handles
1 only 4" safety hasp
1 pair 6" light strap hinges
1 lb. acid core solder

## HELIPORT - LOCATION AND CONSTRUCTION SPECIFICATIONS

A heliport is distinguished from a heliport in that the heliport has road access for fueling and supply. See helispot specifications for principles of location. Adapt these principles to the larger heliport facility. Figures 31 and 32 give the dimensions of required clearings and constructed facilities.

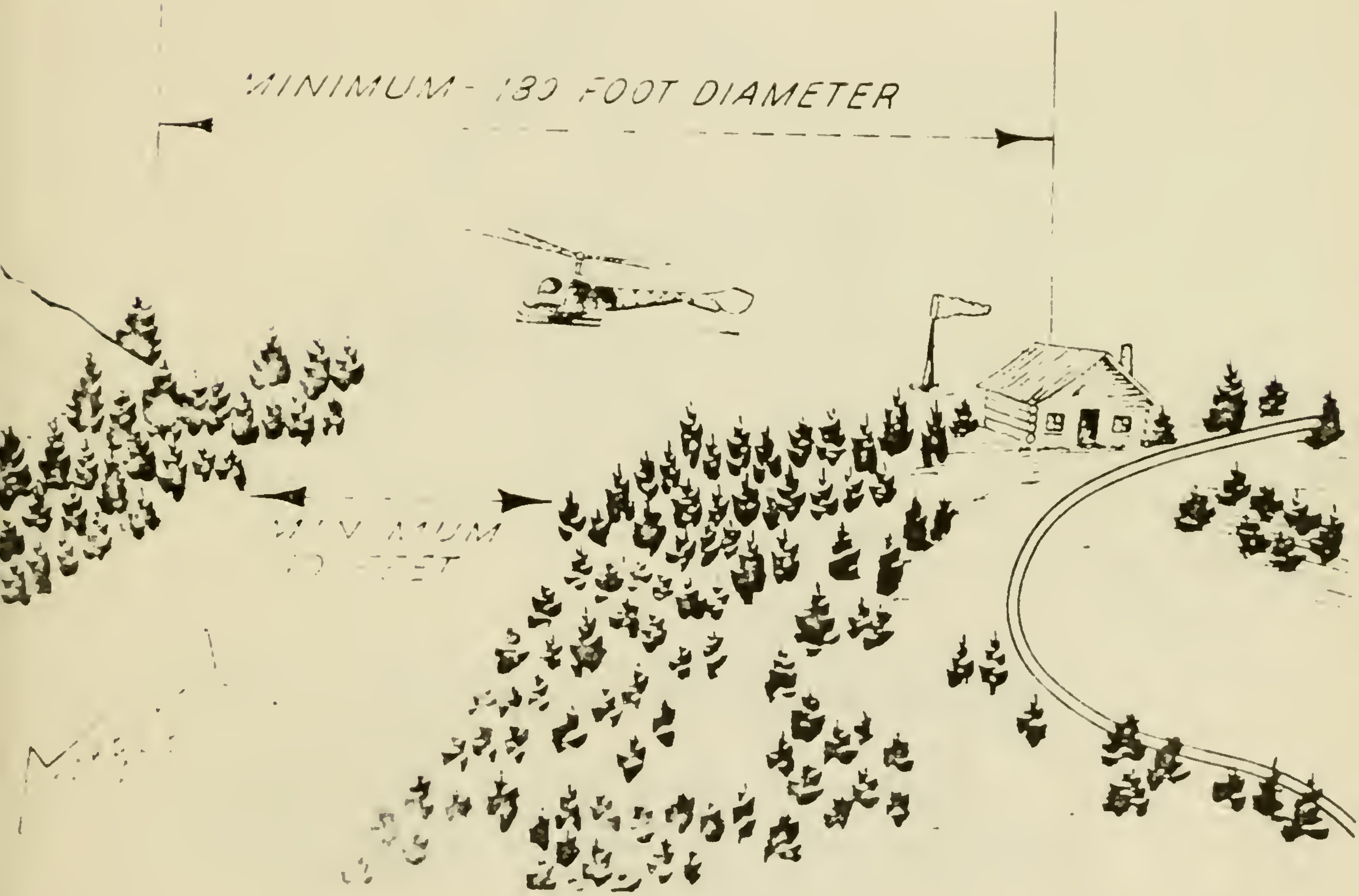


Figure 31

**Heliport Marking.** Heliports will be marked in accordance with official Federal Aviation Agency instructions, shown in figure 32.

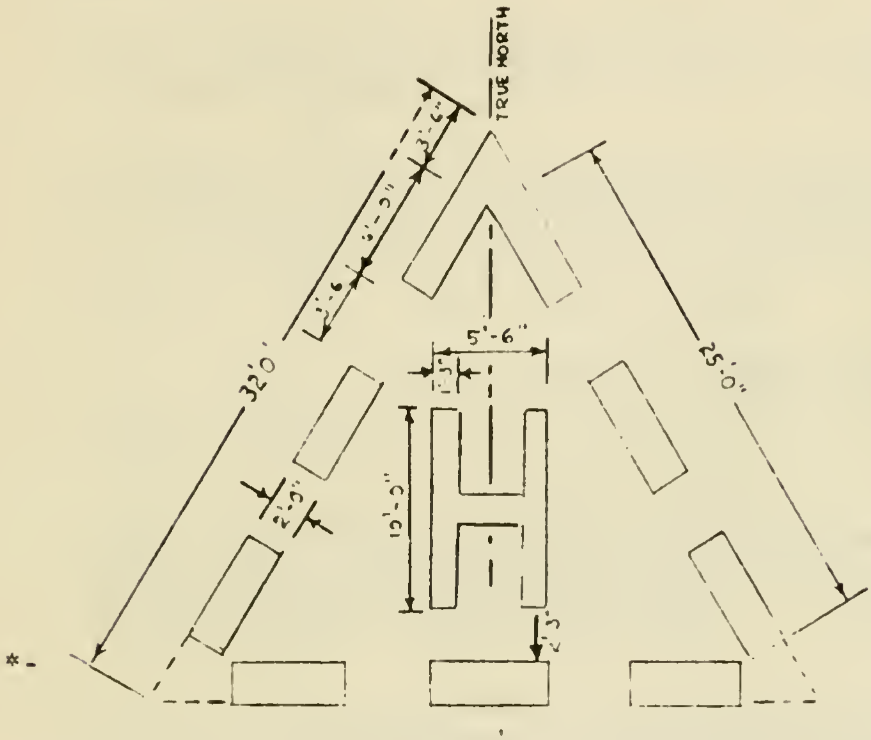


Figure 32. -- Heliport day marker

Color marking (natural or applied) shall provide sufficient contrast with background area. Reflectorized material may be used if desired.

The standard 32 foot-triangular marker shall be placed in the center of the touchdown portion. The letter H shall be centered in the triangle as shown. The triangle shall always be oriented so that the solid apex is pointed true north.

## Helispots (Class T, Touchdown).

A helispot is any designated landing spot for helicopters. It is distinguished from a heliport by lack of road access for fueling and supply.

A helispot consists of a landing area (the area that must be cleared to safely accommodate the helicopter while on the ground) and takeoff and landing lanes. The landing area has within it the touchdown pad on which the helicopter rests its skids while on the ground (figure 33). The helispot should include a wind indicator.

### 1. Ridge Helispot Locations

a. The best helispots are located or exposed knobs. This type of helispot gives a 360-degree choice of takeoff and landing directions.

b. Preferably, choose a spot where a dropoff is possible for helicopter takeoffs. The higher the elevation, the more important the dropoff becomes. Remember that if a helicopter has to make a vertical takeoff, it does so on power alone. With a dropoff, the ship may use less power and be able to carry a larger payload.

c. Locate helispots so that takeoffs and landings can be made into the prevailing wind. This becomes more important with higher elevations.

d. Remove all brush and trees within a 50-foot diameter safety circle around the touchdown pad. Most small helicopters have an overall length of 40 to 44 feet. The diameter of the rotor blades is approximately 37 feet. A 50-foot diameter will give a good safety margin.

e. Clear brush and trees around the landing areas well below this level of the helispot. An exposed knob with natural dropoff into prevailing wind offers the best choices of a helispot.

f. Make touchdown pad level to reduce skid rocking. The pad should slope no more than 10 percent and be stable enough to support 3,300 pounds. The touchdown pad should be at least 15 by 20 feet.

### 2. Level or Bottom-Land Locations

a. A truly vertical takeoff should not be considered safe at any elevation. Remember that a small helicopter must be at least 300 feet above the ground in order to autorotate or glide back to the ground in the event of engine failure.

**Helispot Marking.** Helispots should be marked so that they are visible from the air. Painted rocks or tires can be used to outline the landing area.

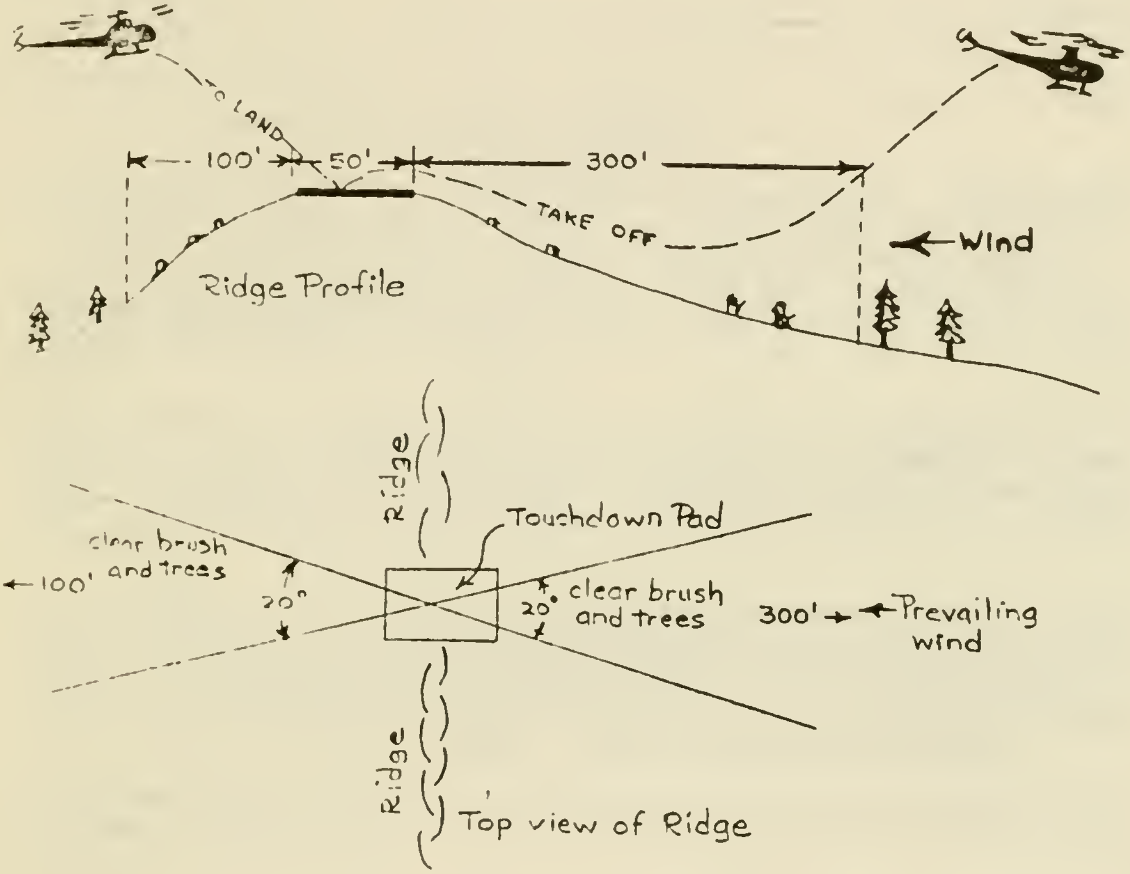


Figure 33. --Ridgetop helispots on a flat ridge. -

1. Vehicles owned by the State shall be driven only by an employee having a valid Montana driver's license. If the vehicle is transporting employees, the driver is expected to have a chaufeur's license.

   a. Where known deficiencies make his driving unsafe, the driver shall be restricted or grounded until such deficiencies are remedied.

   b. Any driver shall be grounded who is habitually careless, repeatedly uses poor judgment at the wheel or willfully violated driving regulations.

   c. All State, city and county rules and regulations for safe driving must be obeyed.

   d. Drivers are permitted to haul, as passengers, only other State employees and cooperators for business purposes.

   e. Cooperative and bonified show-me trips are authorized. When transportation is provided, use travel-alls or buses; DO NOT USE PICKUPS OR TRUCKS. Every care should be taken, when transporting children, to see that all passengers are properly seated and that all doors are closed tightly before vehicle is moved; also that all children remain seated while vehicle is moving.

   f. Every driver of a State-owned vehicle will be held responsible for the use of said vehicle while in his possession. He must know there is sufficient water or anti-freeze in the radiator, oil in the crankcase, transmission and differential, and tires properly inflated before he drives the vehicle.

   g. The assignee of any State-owned vehicle is responsible for its care, use and upkeep. It is his job to see that vehicle is properly equipped, serviced and mechanically safe to drive. He must make weekly reports or see that they are made for every vehicle assigned him, and mail reports to Missoula office. (See weekly vehicle report.)

   h. Employees using State vehicle for other than official purposes will be removed from office.

   i. Greasing, oil changes, and filter changes must be made as recommended by Service Manual or other directives.

2. Required Equipment:

   The following shall be required equipment for every vehicle:

   a. 2 State of Montana Forest Department Official decals (one on each side)

   b. 1 seal or decal (pasted on cowling or dash) that reads:

   "Any officer or employee of the State Government who uses or authorizes the use of any State-owned motor-propelled-passenger-carrying vehicle leased by the State Government for other than official purposes shall be summarily removed from office by the head of the Department or establishment concerned."

Required Equipment (Cont.)

c. 1 Vehicle weekly report book
d. 2 Accident Report Forms and instruction memo
e. 2 Montana license plates
f. 1 First Aid kit (mounted)
g. 1 Spare tire (in serviceable condition)
h. 1 Set tire chains
i. 1 Jack (in serviceable condition) w/handle
j. 1 Screw Driver
k. 1 Pair pliers
l. 1 Set flares
m. 1 Lug wrench and tire changing tool
n. 1 Service Manual
o. 1 Axe or Pulaski
p. 1 Bucket (canvas) water
q. 1 Wrench, 8" crescent
r. 1 Shovel
s. 1 State credit card, in Vehicle Report Book
t. 1 Flashlight
u. Current Vehicle Complaint Card

If any of this equipment is removed, lost, or defective, the supervisor must be notified and a note left on the dash or steering wheel in order that the next driver will know what items are missing.

3. Servicing and Repairing:

a. If minor repairs or adjustments are needed, and you cannot do them yourself, have the work done at a local garage most advantageous to the State. All repair jobs in excess of $25.00 must be approved by your supervisor.

(a). Firewardens of Helena, Stillwater and Swan -- may approve expenditures up to $50.00 per vehicle.

(b). Function Chiefs -- may approve expenditures up to $50.00 per vehicle.

(c). Division Chiefs -- may approve expenditure up to $100.00 per vehicle.

(d). Repairs in excess of $100.00 must be cleared through Budget and Finance.

b. Each individual will personally handle minor vehicle repairs to those vehicles assigned him (supervisors may assign this work to employees but the work will not be done through payment to any shop or through the use of our mechanic). This will include car washing, bolts on license plates, oil changes (where practical), anti-freeze, tire rotation, minor rattles, clean up (inside the vehicle and trunk or box), etc.

c. Oil and oil filters for each vehicle are carried in stock and will be furnished driver upon request. Contact your supervisor when a supply is needed.

d. Oil change, filter change and grease jobs, unless the driver can accomplish it himself, may be purchased by State credit card at local stations.

c. Gasoline is to be obtained whenever possible from State-owned pumps. When State pumps are not accessible, gasoline may be purchased by State credit cards at local stations.

5. Vehicle Motor Numbers & Titles:

It is illegal to destroy or deface any motor number or serial number of a motor vehicle.

Before a motor vehicle is cannibalized or condemned, approval must be obtained through Budget and Finance. The Certificate of Title must be sent to the Registrar of Motor Vehicles for cancellation.

In the event the motor block or frame bearing the Motor No. or Serial No. is used as replacement parts for another vehicle, notice must be given to Budget and Finance so that the necessary changes can be made on the Certificate of Title by Registrar of Motor Vehicles.

License plates for all vehicles that are condemned must be returned to the State Forester's Office for reassignment. They are transferable with coordination through the Registrar's Office.

6. Weekly Vehicle Reports:

a. A vehicle is considered to be any machine with an internal combustion engine that carries the operator (autos, trucks, tractors, graders, etc.). If used, original Weekly Vehicle Report must be submitted to the Missoula Office by the first of the following week.

b. At the end of the month, when it is necessary to report for just a few days, please send these reports immediately. Reports for ALL vehicles whether used or not are needed to close the books for each month.

c. Turn in all purchase slips to "Job Cards" from State shop with the vehicle report. All slips must show vehicle license number or 3F number and signed by the purchaser.

d. If you have some garage work done on the vehicle, including greasing and other servicing, repair at State repair shops (both labor and parts), mark it on the vehicle report.

e. When new tires are purchased or installed on a vehicle, the serial number of the tire must be recorded on the Weekly Vehicle Report.

f. Show all miles travelled. If speedometer is not operating, estimate miles travelled. Speedometer should be repaired as soon as possible.

Each day the vehicle is in use, record primary program for which it was used on line provided under trip terminals or on line opposite washing. Use only one abbreviation for each day. See current memo for acceptable symbols or code numbers.

7. Accidents:

In case of fatal accident to any State employee, immediate notice must be given to the State Forester, Deputy State Forester, or acting member of State Forester's Staff

Automobile accidents involving State-owned vehicles in which bodily injury is involved or where property damage is significant must be immediately reported to either the State Forester or a member of the executive staff.

In the event of an accident involving a State vehicle, render all possible aid to the injured as prescribed by your first aid manual. (If you have not received first aid training, be sure and get it at the first opportunity.)

Notify the City Police Department for accidents occurring in the city and the Highway Patrol for accidents occurring outside the city limits.

Secure the names and addresses of all witnesses, name and address of the other driver and name of his insurance company.

State vehicle should not be moved before the accident is investigated by a Highway Patrolman or police officer where bodily injury occurs or property damage in excess of $25.00 in the city and $100.00 outside the city. All minor accidents in the city must be reported in writing to the Police Department within 5 days after the accident. A written report must be made to the highway patrol for all accidents which results in personal injury or property damage of $100.00 or more to either vehicle.

Immediately following the accident or as soon thereafter as possible, all accidents including one car accidents even if damage is minor, must be reported to the State Forester's Office (Budget & Finance). A complete report must be made using automobile accident report provided for that purpose. One copy will be sufficient. Budget and Finance will in turn forward the report to the State Board of Examiners, etc.

In the event of fire or theft involving State vehicles, a written report should be made as quickly as possible to the Missoula office.

Insurance coverage on State vehicles includes bodily injury, property damage and medical payments in addition to fire and theft.

NO EMPLOYEE SHOULD ASSUME LIABILITY OR AUTHORIZE REPAIRS, TO DAMAGED PROPERTY.

8. Vehicle Inspection:

a. Vehicles will be regularly inspected by an authorized inspector who may be the State Mechanic or by certain Service Stations authorized to make the inspections. Vehicles in regular service will be inspected periodically. Vehicles used seasonally will be inspected before being put into service, regularly while in service, and before being put in storage at the end of the season.

The inspector will make his report on the "Inspector's Safety & Preventive Maintenance Report for Vehicles" form. The completed form will be submitted to the State Forester for review.

b. "Vehicle Complaint Card" will be kept up by the operator to aid the mechanic or inspector.

255.46

# OFFICE OF MONTANA STATE FORESTER

## INSPECTOR'S SAFETY AND PREVENTIVE MAINTENANCE REPORT FOR VEHICLES

Date Location

SF Number Speedometer Type

| | | Item | Constant Requirement | 1 | 2 OK | 3 BO | 4 C |
|---|---|---|---|---|---|---|---|
| LOGBOOK | 1. | Accident forms | In vehicle | 2 | | | |
| | 2. | Logbook entries | Properly recorded | 3 | | | |
| | 3. | Oil and filter | Changed as required | 4 | | | |
| | 4. | Service lubrications | Lubricated as required | 5 | | | |
| | 5. | Vehicle Book | Performed as required | 5 | | | |
| CAB | *6. | Wipers, defrosters, washers | Working properly | 2 | | | |
| | 7. | Horn | Operates properly | 2 | | | |
| | *8. | Steering assembly | Tight in frame, operates properly | 5 | | | |
| | 9. | Clutch pedal | Free play 1-inch minimum | 3 | | | |
| | 10. | Mirrors | Serviceable, snug on bracket | 3 | | | |
| | 11. | Glass, all | Safe, serviceable | 4 | | | |
| | 12. | Seat, backrest, supports | Tight, serviceable | 2 | | | |
| | 13. | Gages, all instrument panel | Operate properly | 2 | | | |
| | *14. | Brakes, service and parking | Safe, fully effective | 5 | | | |
| | *15. | Master cylinder, brake | Fluid at safe level | 5 | | | |
| | *16. | Lights, all | Operating | 5 | | | |
| | 17. | Seat belts | Serviceable condition | 2 | | | |
| ENGINE | 18. | Radiator | Adequate water, clean inside, out | 5 | | | |
| | 19. | Leaks: a. Cooling system<br>b. Engine oil<br>c. Exhaust system<br>d. Fuel system | No leaks | 5 | | | |
| | 20. | Engine appearance | Exterior clean | 3 | | | |
| | 21. | Belts, fan and generator | Serviceable, properly adjusted | 3 | | | |
| | 22. | Oil, Engine | Maintained at proper level | 5 | | | |
| | 23. | Air cleaner | Adequate oil, clean, snug | 4 | | | |
| | 24. | Battery | Adequate water, clean, snug | 5 | | | |
| CHASSIS | *25. | Tie rods and drag links | Not bent, ends snug | 5 | | | |
| | *26. | Tires<br>LF # RF # LR # | Correctly matched, serviceable, safe, proper pressure<br># RR # # Spare # # | 5 | | | |
| | 27. | Wheel bolts | Tight | 3 | | | |
| | 28. | Springs, hangers and U bolts | Good Condition, tight | 2 | | | |
| | 29. | Leaks: a. Brake system<br>b. Gear boxes | No leaks | 3 | | | |
| | 30. | Fenders and body | Good condition, tight | 2 | | | |
| OTHER | 31. | Road test | Operates properly | 3 | | | |
| | 32. | Appearance, care | Clean orderly | 5 | | | |
| | 33. | Miscellaneous gear, tool boxes removable seats | Safely secured, no loose gear or tools in cab | 5 | | | |
| | 34. | Accessories:<br>First aid kit<br>Fire Extinq.<br>License Plates<br>Jack<br>Wheel wrench<br>Tire chains<br>Reflectors | Pulaski<br>Shovel<br>Flare signals<br>Screw Driver<br>Pliers<br>8" Crescent<br>Credit Card<br>Flashlight | 2 | | | |

REMARKS:

*Safety items. Deficiencies in these will automatically ground the vehicle.

Original to State Forester
One copy in Vehicle Book

Inspector

(over)

icate condition by ✓ in applicable column 2,3 or 4. (2 - OK, 3 - Bad Order,
Bad Order condition corrected during the inspection.)

ipment inspectors and mechanics will use the weighted point system in column or rating maintenance condition. Numberical ratings (total deficiency points) corresponding adjective ratings are:

0 to 3 - very good 4 to 6 - good 7 to 9 - fair 10 plus - poor

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## Inspector's Findings and Recommendations

This portion of this manual has been written with two objectives in mind:

1. To make you a safer driver-operator;
2. To give the information and know-how to be a better driver-operator and caretaker of State equipment.

The old saying "An ounce of prevention is worth a pound of cure" cannot be applied more effectively anywhere than in the operation of our State equipment.

Whether the "ounce of prevention" is in the careful handling of State equipment, or in a careful check on our service work, the result is still the same. Preventive maintenance is not something to be done when we have time to spare, but it should be a part of our everyday schedule as well as lunch and coffee break.

If our service work and inspections are kept up to date from day to day, it will not be harmful if we deviate from that schedule on those days when we have an emergency such as a fire, providing the service work is again taken up immediately after the crisis is past.

Like many things that are new, this manual will not have all the answers to everything pertaining to equipment but, by applying the methods and procedures outlined here we can eliminate most of our troubles of the past.

There will be revisions and additions to this manual from time to time as our equipment and products we use are improved. We cannot write a manual with all the answers as we would like because in less than a seasons time some parts will have become obsolete and new methods and procedures come into use.

1. Preventive Maintenance:

   a. Lubrication - See lubrication chart for detailed instructions, lubricate at recommended mileage interval shown for the type of use the vehicle is being put to at that time. If in doubt always use the next lower mileage bracket. Oil and grease properly applied is one of our best preventive maintenance measures.

   b. Oil and filter Changes - Oil and filter changes are to be made on all vehicles at intervals shown on the lubrication chart. The operator is responsible for seeing that these changes are made at the prescribed intervals.

   c. Gasoline - Use regular grade gasoline and fill at Forestry Department pumps when possible. Never put so called bargain gasoline in a State vehicle.

2. Drivers Responsibilities:

Operators are required to exercise the same caution when driving State vehicles as they would when driving their own. Such damage as springs broken from speed on rough roads or overload, and damage to running boards, fenders, tie rods, gasoline tanks, and axles can usually be avoided. The operator will be held responsible for abusive use. Use the complaint card in the mileage book of each vehicle. If there is not one in the vehicle see your superior immediately for a new complaint card. Fill out the periodic check list and

send it in with vehicle mileage slip. Each operator shall insure that the vehicle is in mechanically safe condition by checking the following:

a. Tires: for inflation, cuts, breaks, etc.
b. Leaks: fuel, oil and water
c. Crankcase
d. Coolant level in radiator: adequate
e. Lights and signal devices: operating properly
f. All glass (including rear window and light lenses): clean
g. Mirrors properly adjusted and clean
h. Fuel supply adequate
i. Horn functioning properly
j. Brakes functioning properly
k. First aid kit; tire changing tools and jack
l. Equipment mileage book: up to date and properly recorded.

Some vehicle defects can be detected only while the vehicle is in operation. An accident or serious damage can be avoided by keeping constantly alert for signs of defects and taking immediate corrective action as necessary.

Major items to check while in operation are:

a. Foot and hand brakes
b. Clutch
c. Transmission
d. Transfer case
e. Engine and controls
f. Instruments
g. Steering gear
h. Running gear
i. Body

3. After Operation Check:

This check is intended primarily to initiate action to correct any deficiencies found in the "During operation" check. Where vehicles are on emergency use the before operation check should be made at the end of a trip to insure that the vehicle is ready to go at any time. This especially applies to fire tank trucks.

4. Braking:

a. Use engine as brake - Whenever you apply brakes, heat is generated and some of the lining is worn away. If you hold them on continuously the brake lining may be burned. Save your brakes by using your engine to slow your vehicle and your brakes merely to assist the engine. Think ahead. Begin to slow down early by taking your foot off the accelerator while leaving the clutch engaged. Then apply the brakes firmly but gradually so as to stop quickly but without shock to the vehicle or jarring the load. Leave the clutch engaged until the vehicle has almost stopped. A little practice will teach you when to disengage it to keep the engine from stalling.

This does not mean that the engine can or should be used as a brake by shifting to a lower gear for such normal stops as stop signs or traffic lights.

Braking (Cont.)

b. Be kind to your brakes - When using the foot brake on hills, you should take the following precautions to prevent skidding or overheating brakes.

(a) Apply the brakes firmly but not abruptly. Abrupt application with full force may lock the wheels and cause your vehicle to slip or skid out of control.

(b) Apply the brakes at intervals only as you need them.

c. Hand brake - The hand brake is designed to hold a stopped vehicle stationary; Do Not use it to stop or slow down except in an emergency. The foot brake is far more effective and will not crack an axle or drive shaft.

### 5. Faulty Starting:

Long-continued turning over of the engine with the starter discharges the battery very rapidly and may shorten its life. Do not keep the starter engaged for periods of more than 10 to 15 seconds at a time. Always disengage the clutch when starting the motor. When starting a cold motor always pull the choke all the way out before engaging the starter. This saves time that the starter must turn the engine before starting.

Never start an engine on more than ¼ throttle and with a warm engine, in most cases, it will start better on no throttle or idle position.

Do not depress the throttle on a warm engine before engaging the starter, as this feeds the engine a charge of fuel and may cause it to be flooded.

### 6. Use of Choke:

Use the choke as little as possible. When starting a cold engine pull the choke all the way out and then immediately push it in as soon as the engine begins to fire.

In winter starting it may be necessary to run the engine with the choke part way out for the first minute or two to keep the engine running. Do not leave an engine to warm up with the choke part way out. Be sure the engine will continue to run with the choke all the way in before leaving it to warm up. Do not race a cold engine; let it warm up on a fast idle. If the engine has a galloping sound and black or gray smoke comes from the exaust it is because the choke is too far out. Push it in until it runs smoothly and then let it warm for a short time depending on the temperature.

### 7. Safe Operation on Hills:

It is risky to change gears while climbing or descending a hill. Therefore the safest procedure is to select the proper gear before starting to climb. However, should it be necessary to go to a still lower gear, make the shift before the engine slows down to a stalling point.

Safe Operation on Hills (Cont.)

Do not depend on your brakes alone on a steep hill. If the road is slippery and your vehicle starts to slide with the brakes set you will lose control because you cannot steer with the wheels locked. Use a lower gear and leave the clutch engaged. This causes the driving wheels to turn the engine. You will have the effect of brakes yet the wheels will revolve freely enough to permit steering control.

a. Up Hill: If you stall the engine while climbing a steep hill and must back down, apply the foot brake, set the hand brake, disengage the clutch, and shift quickly into reverse. If the vehicle does not slide or roll start the engine while the clutch is still disengaged, and engage the clutch while releasing the brakes.

   If the vehicle slides or rolls while the clutch is disengaged, re-engage it immediately after shifting into reverse and release the brakes. If the engine does not start turning immediately, use the starter to relieve strain on the gears then back down.

b. Down Hill: When you approach a down grade, first select a suitable gear. A good rule for driving down hill is to use one gear lower than you would drive up the same hill. Keep the clutch engaged, the throttle closed and the ignition "on" before the vehicle starts down, and then observe the following instructions.

   (a) Keep the vehicle under complete control at all times. Men's lives may depend upon your actions.

   (b) Never exceed the maximum permissable speed limit for the particular gear selected.

   (c) Reduce speed with the foot brake to keep the vehicle within the speed limit shown on the caution plate.

   As long as you keep your foot off the accelerator the engine will resist the tendency of your vehicle to roll faster because the wheels will be driving the engine instead of the engine driving the wheels. The result is effective and safe braking.

   Coasting downhill in neutral is never permitted.

   Look out for excessive engine speed while going downhill.

Your engine may have a governor that limits the R.P.M. while pulling, but when the engine is being pushed such as going down hill the governor has no effect and it is possible to cause the engine to over speed to the point where the strain is too great and it will break up and fly to pieces.

This has happened to many government vehicles with poor drivers. When going down a hill, notice which gear is engaged. Observe the caution plate on your panel, or decal on the speedometer. Use the foot brake as needed to keep your vehicle speed under the maximum speed shown for that gear.

8. Don't "Ride" the Clutch:

Keep your foot off the clutch pedal except when starting, stopping, or shifting. Even a slight continued pressure on the clutch pedal wears the clutch throw-out bearing. For the same reason when stopped on a hill, never slip your clutch to prevent the vehicle from rolling back, use your brakes instead.

9. Backing:

People have been killed because the driver failed to look behind his vehicle before backing. The rear view mirror shows only what is to the side but nothing that is low or immediately behind a vehicle. It is therefore necessary that the driver either look behind the vehicle before backing or be guided by a helper who can see all of the area involved.

a. Back slowly. Be sure there is sufficient clearance before backing into garages or other narrow places.

b. Avoid long backing on mountain roads. It is much safer to turn around and drive.

c. Avoid backing down hill.

d. When turning on mountain roads always back toward the bank.....face danger.

10. Parking:

When parking on a hill if your vehicle is equipped with a manually engaged transmission, set the transmission in the lowest gear in the direction the vehicle would roll if the brakes should fail. If the vehicle should roll forward use first gear, if it should roll backward use reverse.

11. Tire Care:

Tires should be checked daily during the fire season. Practice tapping the tires with a hammer and after a few trys you will learn the feel of a soft tire. This method will do for a daily check but they should be checked with a gauge weekly.

Watch the dual wheels for rocks stuck between the tires. Take them out immediately. Avoid sideswiping rocks or stumps as this may damage the tires.

12. All-Wheel Drive Vehicles:

a. General: The all-wheel drive vehicles were designed for a specific purpose - to provide extra power and traction to travel at slow speed over rough or unusual terrain. Accidents and the high cost of operation of all-wheel drive vehicles are, in most cases, caused by abusive use or expecting the impossible from these vehicles.

Material covered in this chapter is intended to point out the safe economical way to get the most out of these vehicles. The same general safe driving practices covered previously apply to all-wheel drive vehicles.

All-wheel Drive Vehicles (Cont.)

b. Operation:

(a) All-wheel drive should be used only when greater traction and power are required than can be provided by a standard transmission in low gear (except on the Dodge power wagon). If the load is heavy or the going rough as to require first gear in the main transmission then it is good practice to shift the front wheel drive into gear to distribute the load to all wheel drive instead of just the rear wheels. This front wheel drive can be shifted in and out of gear as is necessary without stopping or disengaging the clutch. The power must be released momentarily to shift into front wheel drive. Shifting out of front wheel drive may require that the power be alternatingly put on and off to release the tension built up between the front and rear axles. If you are on a hard surface road drive the right hand wheel to the outer edge of the road so that it may travel over some loose gravel and in that way will slip and relieve the wind up between the front and rear axles and make it possible to shift out of front wheel drive. Do this with the clutch engaged.

(b) To shift into low range the vehicle must come to a stop. The same applies when shifting from low to high range. The front wheel drive lever must be in the "in" gear position before the front wheel drive can be shifted in or out while in high range but low range cannot be used without front wheel drive. Never use force to shift gears. To do so can only cause trouble. Learn to shift properly and you will find that force is not needed.

The gear shift lever position diagram is fastened near the shift lever. Study the diagram carefully and practice shifting before driving the vehicle. It is important that operators analyze the terrain and select the proper gear before attempting to travel over difficult terrain. Failure to do so often results in becoming stuck or damaging the power train unit.

c. Front Wheel Locking Type Hubs: In addition to transfer case gear selections the front wheels of some all-wheel drive vehicles are equipped with locking type hubs. These hubs are provided so that the front axle can be disengaged when driving in two-wheel drive. When front wheels are not so equipped the wheels turn the axle and differential, while the vehicle is in two wheel drive. When the locking type hubs are used properly the wear on the front end gear train is greatly reduced.

Some of these hubs are manually controlled. Other models engage and disengage automatically. Be sure to check the type on your vehicle.

Never shift into all-wheel drive with the manual control type hubs in the free position. To do so will put all the power on the rear axle and drive shaft causing damage.

Front Wheel Locking Type Hubs (Cont.):

The automatic type must be manually locked when using all-wheel drive for descending steep grades. Do not force hub locks in or out of locking position with makeshift tools - rock the vehicle slightly and the splines will engage.

d. Tire Chains: When tire chains are required they should be used insofar as possible on the rear wheels only and on all four wheels under only the most severe conditions; tire chains are never to be used on the front wheels alone. When tire chains are used on all four wheels, excessive maintenance cost can be expected and the user must be prepared to justify such use.

e. Driving Techniques: All-wheel drive vehicles do not have the roadability that conventional vehicles do; as a general rule for safe operation all-wheel drive vehicles should be driven 15 miles per hour less on highways that would be normal for conventional vehicles. Never exceed a speed of 40 miles per hour with an all-wheel drive vehicle.

When descending grades with heavy loads do so with all-wheel drive engaged. Where so equipped, lock the locking hubs in the locked position. This affords double safety in case one axle or drive shaft should break.

Know the limitations of your vehicle and do not exceed them.

f. Winch Operation: Check the power take-off plate for correct lever position. Always disengage clutch before shifting gears. When winch is not being used, lock the shift lever in neutral position. Never operate the winch at more than ¼ throttle. Play out the cable by disengaging the jaw clutch and pulling the cable out by hand. Use the reverse only for lowering a load.

Do not kink or bend the cable. Do not tie knots in cable for repair except only in emergency. Do not pull at an angle to the load. A cable snapped under stress is extremely dangerous. The snapback of loose ends can kill a man or cost him his leg. All persons shall stand clear before the cable is tightened.

When rewinding the cable after use either drag a weight until the cable is almost all rewound or have a helper hold the cable taut by the hook, never allow the cable to slide through the hands. Wind slowly and hook to proper anchor on truck. Draw taut and place power take-off in neutral.

Because all-wheel drive vehicles are used under more severe conditions than convential vehicles, they must be checked and lubricated more often. Under extreme conditions where there is mud, snow, water, or heavy dust, it may be necessary to service the vehicle daily.

Keep the engine oil at the full mark constantly. This may require carrying extra oil when operating over steep rough terrain. This is necessary to assure lubrication when the oil pan is tipped.

Check for water in gear boxes and engine after fording streams.

g. Mismatched Tires: Mismatched tires will result in early failure of axle assemblies and transfer cases. All tires should be matched to within 1/8 inch diameter. Mismatched tires will result in a wind up or binding action and gives the driver the feeling that a brake is dragging. It also makes it hard to shift out of front wheel drive.

Never use snow tires on rear wheels, as snow tires of the same size are larger than highway tires and if used at all should be on all four wheels.

13. Fire Tank Trucks:

Preceding material covering vehicle care and operation also applies to the fire tank truck except for a few things as set forth here that apply to fire tank trucks alone.

The first consideration is to get the equipment to the fire in good condition; speed of response is of secondary importance. Keep your truck under control at all times and remember that it may be the careless other fellow who may cause your vehicle to fail to reach the fire. Remember when responding to a fire call; The Most Efficient Way To Do Any Job Is The Safe Way.

Never spot the tank truck in such a position that there is no way out. If the direction of fire spread will endanger the truck, turn around and head the other way. Keep hose lines clear of the wheels so that in an emergency the truck can be moved without disconnecting the hose lines.

Do not move the tanker ahead of a fire or through a hot burn without first scouting the area to make sure it is clear and that retreat is possible.

Do not let the truck stand in hot burns or remain too close to the fire without hose protection to keep it cool. Reflected heat can soon raise the temperature in the gasoline tank and cause large quantities of vapor to be discharged. If the vapors reach sparks or embers, they will ignite and carry the fire to the gas tank of the truck.

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